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U.S. Department of Energy
Idaho Operations Office

Comprehensive Remedial Design/Remedial Action Work Plan for the Test Area North, Waste Area Group 1, Operable Unit 1-10, Group 2 Sites

INEEL
Idaho National Engineering and Environmental Laboratory
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Approved by

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WAG 1 Project Manager

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Date

ABSTRACT

This *Comprehensive Remedial Design/Remedial Action Work Plan for the Waste Area Group 1, Operable Unit 1-10, Group 2 Sites* was developed to implement the selected remedy as stated in the *Final Record of Decision for the Test Area North, Operable Unit 1-10*. The two sites addressed in this work plan are the Intermediate-Level (Radioactive) Waste Disposal System (Technical Support Facility [TSF]-09) and the Contaminated Tank southeast of V-3 (TSF-18). Collectively, the sites are referred to as the V-Tanks. As presented in the Final Record of Decision, the two sites pose a threat to human health and the environment. The 1999 Final Record of Decision and 2001 Explanation of Significant Differences determined the selected remedy for the sites as soil and tank removal, ex situ treatment of tank contents, and disposal of the removed material. This work plan describes the remedial design and remedial action for the selected remedy and references supporting documents required to conduct this Comprehensive Environmental Response, Compensation, and Liability Act remedial action.

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ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
ATG	Allied Technology Group
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOT	Department of Transportation
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FFA/CO	Federal Facility Agreement and Consent Order
FRG	final remediation goal
FSP	field sampling plan
GAC	granular-activated carbon
HASP	Health and Safety Plan
HIC	high-integrity container
HWD	hazardous waste determination
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
INEEL	Idaho National Engineering and Environmental Laboratory
IX	ion exchange
LDR	land disposal restriction

LSA	low specific activity
LSC	Low Safety Consequence
M&O	management and operation
MCP	management control procedure
NESHAP	National Emission Standards for Hazardous Air Pollutants
O&M	operations and maintenance
OU	operable unit
PCB	polychlorinated biphenyl
PLN	plan
PPE	personal protective equipment
PRD	program requirements document
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RD/RA WP	Remedial Design/Remedial Action Work Plan
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SOW	scope of work
SVOC	semivolatile organic compound
TAN	Test Area North
TBC	to be considered
TBD	to be determined
TCLP	toxicity characteristic leaching procedure
TPR	technical procedure
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
TSF	Technical Support Facility

VCO	Voluntary Consent Order
VOC	volatile organic compound
WAC	waste acceptance criteria
WAG	waste area group
WRRTF	Water Reactor Research Test Facility

Comprehensive Remedial Design/Remedial Action Work Plan for the Test Area North, Waste Area Group 1, Operable Unit 1-10, Group 2 Sites

1. INTRODUCTION

In accordance with the *Federal Facility Agreement and Consent Order* (FFA/CO) (Department of Energy Idaho Operations Office [DOE-ID] 1991) between the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Idaho Department of Environmental Quality (IDEQ), hereafter referred to as the Agencies, the DOE submits the following Comprehensive Remedial Design/Remedial Action Work Plan (RD/RA WP) for the Group 2 sites at Test Area North (TAN). Under the current remediation management strategy outlined in the FFA/CO, the location identified for the remedial action is designated as Waste Area Group (WAG) 1, Operable Unit (OU) 1-10 at the Idaho National Engineering and Environmental Laboratory (INEEL).

As part of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq.), the release sites at TAN OU 1-10 were evaluated through a comprehensive remedial investigation/feasibility study (RI/FS) (DOE-ID 1997). The RI/FS assessed the investigations previously conducted for WAG 1, thoroughly investigated the sites not previously evaluated, and determined the overall risk posed by the WAG. The OU 1-10 RI/FS culminated with the finalization of the OU 1-10 Record of Decision (ROD) (DOE-ID 1999). The ROD identified eight sites requiring remedial action and the specific remedies for each. To facilitate remediation, and as agreed to by the Agencies, the eight sites requiring remediation in WAG 1 are divided into three groups. The sites included in each group are presented in Table 1-1.

Table 1-1. WAG 1, OU 1-10 sites requiring remediation.

Group	Sites
Group 1	Soil Contamination Area south of the Turntable (Technical Support Facility [TSF]-06, Area B), Fuel Leak Site (Water Reactor Research Test Facility [WRRTF]-13), and PM-2A Tanks soil excavation (TSF-26)
Group 2	TSF Intermediate-Level (Radioactive) Waste Disposal System (TSF-09) and Contaminated Tank southeast of Tank V-3 (TSF-18)
Group 3	PM-2A Tanks tank contents removal (TSF-26) and the Burn Pits (WRRTF-01 and TSF-03)

The Group 2 sites are addressed in this RD/RA WP. The two sites, the TSF Intermediate-Level (Radioactive) Waste Disposal System (TSF-09) and the Contaminated Tank southeast of Tank V-3 (TSF-18), are of similar nature and location and are collectively referred to as the V-Tanks. Soil surrounding the tanks is contaminated from tank operations. The sites were evaluated together in the supporting documents in the RI/FS and ROD and were identified as requiring remediation, as releases from the sites pose imminent and substantial endangerment to human health and the environment.

The OU 1-10 ROD presents alternative remedies to be considered for the V-Tanks and the selected remedy to be conducted at the sites. Based upon CERCLA requirement considerations, detailed analysis of alternatives, and public comments, the Agencies' selected remedy presented in the ROD is soil and tank removal, ex situ treatment of tank contents, and disposal of removed materials. The selected remedy addresses the risks posed by the V-Tanks by effectively removing the source of contamination and

breaking the pathway by which a future receptor may be exposed. The 2001 OU 1-10 Explanation of Significant Differences (ESD) (DOE-ID 2001a) adds additional detail regarding onsite ex situ treatment and waste storage.

Within the boundary of the Group 2 sites are non-CERCLA components managed under a Voluntary Consent Order (VCO) between the State of Idaho and the DOE to correct potential Hazardous Waste Management Act/Resource Conservation and Recovery Act (RCRA) noncompliance's (IDEQ 2000). These components will be removed as part of the Group 2 Remedial Action in accordance with the RCRA-regulated VCO.

1.1 Work Plan Organization

This Group 2 RD/RA WP presents the design and implementation strategy for the ROD-selected remedy. The following are brief descriptions of the work plan sections and appendices:

- Section 1, Introduction, describes the background and history of the Group 2 sites and gives an overview of the selected remedy implementation approach addressed in this RD/RA WP.
- Section 2, Design Basis, provides the remedial action objectives, remedy performance objectives, and design objectives to be achieved by this Group 2 RD/RA WP. Design codes, industrial standards, and INEEL and DOE requirements are also presented.
- Section 3, Uncertainty Management, identifies several project uncertainties and describes the project management approach for uncertainties that may be encountered during the remedial action.
- Section 4, Remedial Design, presents a summary of the design assumptions, criteria, technical design components, and quality assurance and safety category evaluations.
- Section 5, Environmental Compliance, lists the applicable or relevant and appropriate requirements (ARARs) and the compliance strategy to be implemented for each ARAR.
- Section 6, Remedial Action Work Plan, presents the necessary steps and documentation required to complete the remedial action. Remedial action work tasks, supporting documents, and inspections are presented in this section.
- Section 7, Changes to the Remedial Design/Remedial Action Scope of Work and Group 2 Remedial Design/Remedial Action Work Plan, discusses changes to the OU 1-10 Remedial Design/Remedial Action (RD/RA) Scope of Work (SOW) (DOE-ID 2000a) and the Group 2 RD/RA WP, and the creation of the Group 3 RD/RA WP.
- Section 8, Institutional Controls, Operations and Maintenance, and Five-Year Review, describes the necessary actions to occur after the remedial action has taken place.
- Section 9, References, is a list of referenced material.
- Appendix A, Design Drawings, contains drawings that illustrate the work to be performed during the remedial action.
- Appendix B, Design Specifications, contains the technical and engineering details of equipment, materials, and procedures to be used in the remediation.
- Appendix C, Design Calculations, provides the technical analysis of all components to be implemented in the effort. Dose rate calculations, transportation and packaging analyses, and engineering calculations are included in this appendix.

- Appendix D, Air Emissions Modeling and Data Output, presents a summary of the results of the air emissions evaluation to satisfy project ARARs.
- Appendix E, Safety Category Evaluation (formerly Quality Level Evaluation), presents the safety category designation for each component of the remedial action.
- Appendix F, Remedial Action Cost Estimate, provides an estimate of the total projected costs for implementing the remedial action.
- Appendix G, Tank V-9 Analytical Results and Analysis Report, presents the results from the 2001 Tank V-9 contents sampling and analysis.
- Appendix H, V-Tanks Characterization Sampling Data, presents the historical sampling data for the V-Tanks soil and tank contents.
- Appendix I, V-3 Overflow Prevention Plan, discusses the contingency plan should Tank V-3 approach overflow conditions before the remedial action is implemented.
- Appendix J, Agency Comment Resolution Forms, provides the comment resolution forms used to resolve the draft and draft final comments received from the Agencies on the RD/RA WP and associated documents.

1.2 Background

1.2.1 Area Background

The INEEL is a government-owned/contractor-operated facility managed by the DOE-ID (Figure 1-1), located 51 km (32 mi) west of Idaho Falls, Idaho. The INEEL occupies 2,305 km^2 (890 mi^2) of the northeastern portion of the Eastern Snake River Plain and encompasses portions of five Idaho counties: (1) Butte, (2) Jefferson, (3) Bonneville, (4) Clark, and (5) Bingham County. Test Area North is located at the northern end of the INEEL, approximately 96 km (60 mi) from Idaho Falls, Idaho. The facility was originally built between 1954 and 1961 to support the Aircraft Nuclear Propulsion Program sponsored by the U.S. Air Force and the Atomic Energy Commission. The program's objectives were to develop and test designs for nuclear-powered aircraft engines (DOE-ID 1997). Upon termination of this research in 1961, the area's facilities were converted to support a variety of other DOE research projects. From 1962 through 1986, the area supported reactor safety testing and behavior studies at the Loss-of-Fluid Test Facility. Beginning in 1980, TAN was used to conduct work with material from the 1979 Three Mile Island reactor accident (DOE-ID 1997). Current activities include the manufacture of armor for military vehicles at the Specific Manufacturing Capability Facility and nuclear inspection and storage operations at the TSF (DOE-ID 2000b). Decontamination and dismantlement of the Initial Engine Test Facility was completed in 2000.

1.2.2 Remedial Action Sites

The remediation sites addressed under this Group 2 RD/RA WP are located at TAN. TSF-09 and TSF-18 (the V-Tanks) are situated in an open area east of TAN-616 and north of TAN-607 (Figure 1-2). Soil contamination attributable to the V-Tanks surrounds these tanks. The area of contamination (AOC) defined by the contaminated soil is estimated at 15.2 m (50 ft) by 24.4 m (80 ft) (DOE-ID 1999). Several non-CERCLA components are located within the AOC (Figure 1-4), which may impede access to the V-Tanks, including the TAN-1704 valve pit and adjacent piping as indicated in the remedial design drawings (Appendix A, Sheet 7 of 20, Pipe Removal Plan). The valve pit is associated with the former V-Tank operations.

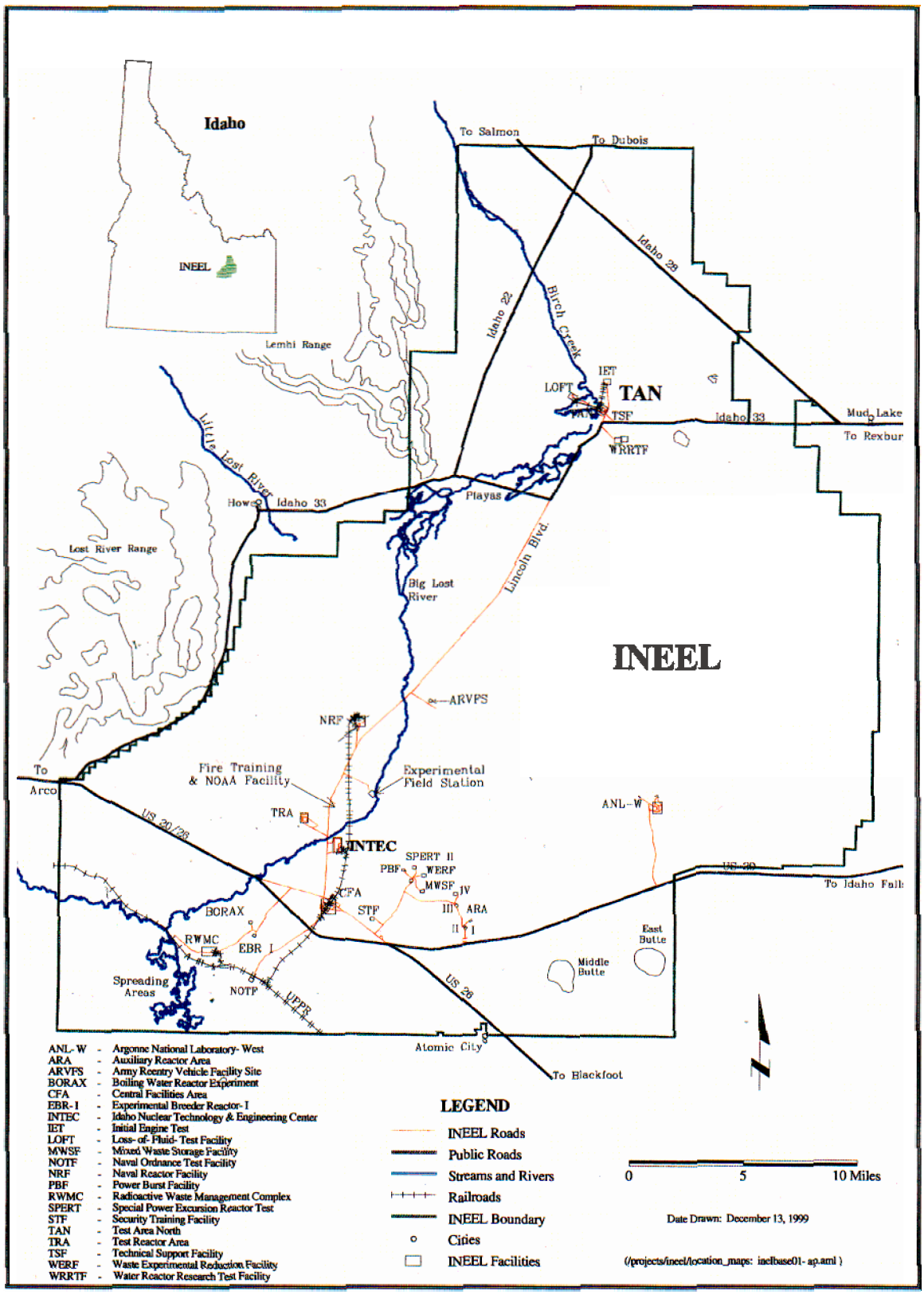


Figure 1-1. Location of Test Area North at the Idaho National Engineering and Environmental Laboratory.

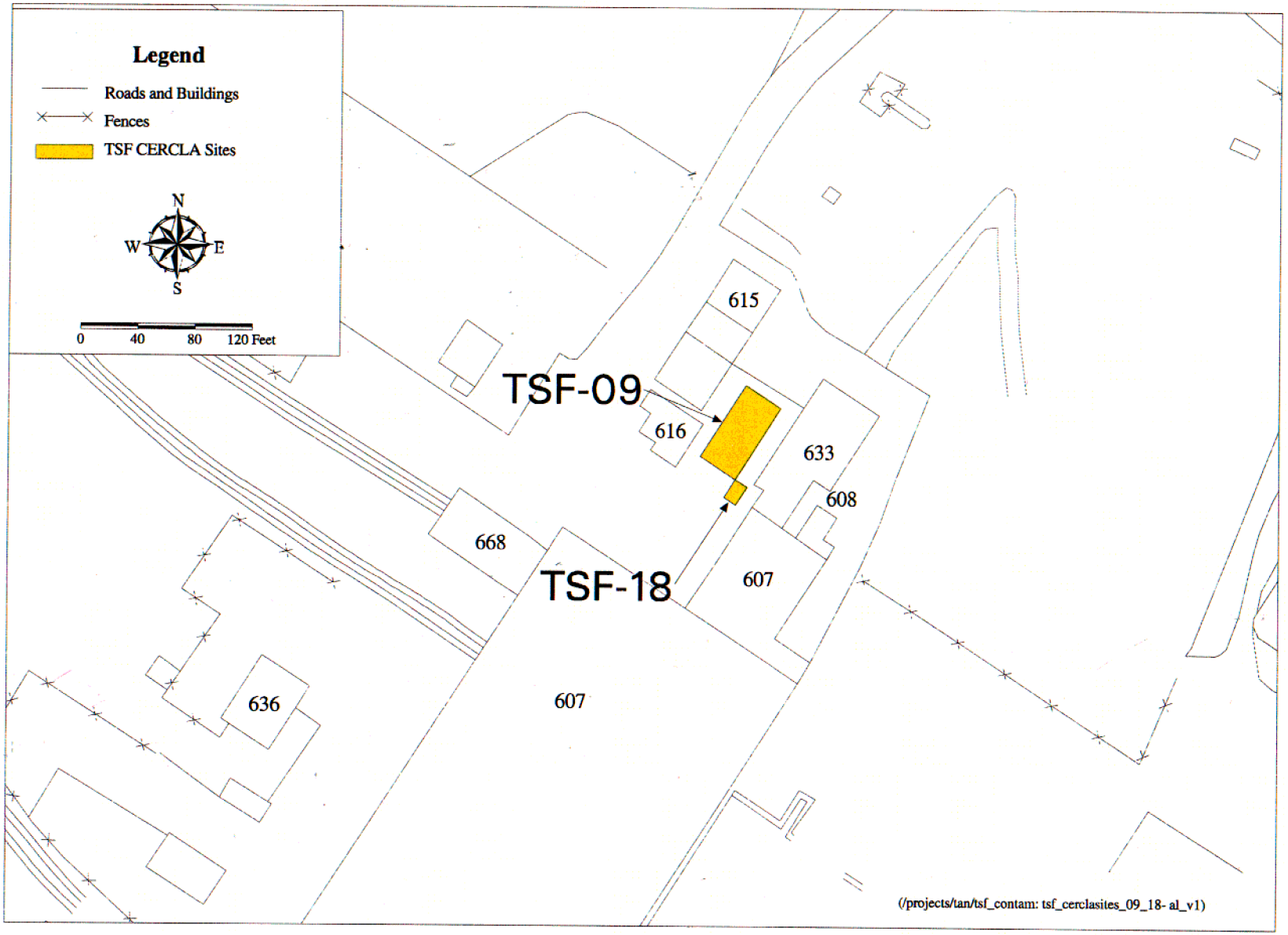


Figure 1-2. V-Tank Sites at TAN.

Waste was transferred from the TAN-616 evaporator pit sump and pump room sump, the TAN-607 laboratory drain, the TAN-607 Warm/Hot Shop drain, and TSF-21 (Valve Pit #2) through the TAN-1704 valve pit (Valve Pit #1) to TSF-18 (Tank V-9). The overflow from Tank V-9 drained to TSF-09 (Tanks V-1, V-2, and V-3) (INEEL 2001a). Figure 1-3 depicts the relationship of these units and the primary waste sources. The following sections provide brief descriptions of TSF-09, TSF-18, the contaminated soil attributable to both units, and the non-CERCLA components to be addressed under this RD/RA WP.

1.2.2.1 TSF-09, TSF Intermediate-Level (Radioactive) Waste Disposal System. The TSF-09 consists of three 37,860-L (10,000-gal) underground storage tanks (Tanks V-1, V-2, and V-3), ancillary lines, and surrounding contaminated soil. The tanks and associated piping were installed in 1953 and became operational in 1958. The tanks were designed to collect and store liquid radioactive waste at TAN. The waste was stored in the underground tanks then treated in the evaporator system located in TAN-616. Residues from the TAN-616 treatment process were sent to the PM-2A tanks at TSF-26 or the TSF injection well (condensate). In 1970, the TAN-616 evaporator system failed and all wastes were directed to the PM-2A tanks (DOE-ID 1997). After 1975, the waste was removed from the tanks through the tank vent pipes using a sump pump. The waste was pumped into tanker trucks and shipped to the Idaho Chemical Processing Plant (INEL 1994). Tanks V-1 and V-3 became inactive in the early 1980s. Tank V-2 was taken out of service in 1968 after a large quantity of oil was discovered in the tank. The oil was removed in 1981. In 1982, the free liquid was removed from the V-Tanks. Additional wastewater was reportedly added to Tank V-3 through 1985. Starting in 1985, all low-level radioactive waste at TAN was rerouted to the TAN-666 evaporator through a piping modification in the TAN-1704 valve pit. The piping modification stopped intentional discharge to the V-Tanks in 1985. There is no evidence that sludge accumulating in the tanks was removed during or after site operations (DOE-ID 1997).

Tanks V-1, V-2, and V-3 are stainless steel tanks measuring 3 m (10 ft) in diameter, 5.5 m (18 ft) long, and buried approximately 3 m (10 ft) below ground surface. The tanks have 50.8-cm (20-in.) manholes that are accessible through 1.8-m (6-ft) diameter culverts installed in 1981 (DOE-ID 1997). Each tank is equipped with three subsurface influent lines and one subsurface effluent line. The tanks received radioactive wastewater via an influent line from Tank V-9 (Figure 1-3). The remaining influent lines include a caustic line used to neutralize the waste prior to transfer to TAN-616 and a return flow line from the TAN-616 pump room. Tank V-3 has an additional inlet line from the TAN-615 east and west sumps. A single effluent line on each tank is routed to the TAN-616 pump room and evaporator system (Appendix A).

Liquid level measurements, recorded since April 1996, track the fluid levels in V-1, V-2, and V-3. Measurements since 1996, and anecdotal information preceding 1996, indicate an increase in the liquid level in Tank V-3 during the spring. All lines, valves, and drains associated with the TSF-09 tanks are either plugged or identified as inactive; therefore, the increase is believed to be from spring snowmelt and runoff entering the tank through the culvert above the entrance to Tank V-3. Liquid level measurements in Tanks V-1 and V-2 have remained relatively constant (DOE-ID 1997).

The volume of liquid and sludge in the TSF-09 tanks has been estimated based on the results of the 1996 RI/FS sampling (DOE-ID 1997). The volume of solids in Tanks V-1 and V-2 is approximately 1,965 L (520 gal), and Tank V-3 has an estimated 2,465 L (652 gal) of sludge. Estimated liquid volumes for Tanks V-1, V-2 and V-3 are 4,400 L (1,164 gal), 4,067 L (1,076 gal), and 22,000 L (5,818 gal), respectively (Blackmore 1998). From liquid level measurements, the current volume of V-3 is estimated as 31,419 L (8,300 gal), which represents 2,456 L (652 gal) of sludge and 28,951 L (7,648 gal) of liquid.

Based on the 1993 Track 2 investigation and the 1996 RI/FS sampling results, the potential contaminants of concern (COCs) for the three tanks were metals (e.g., mercury, chromium, and lead), volatile organic compounds (VOCs) (e.g., tetrachloroethene, trichloroethene, and carbon tetrachloride),

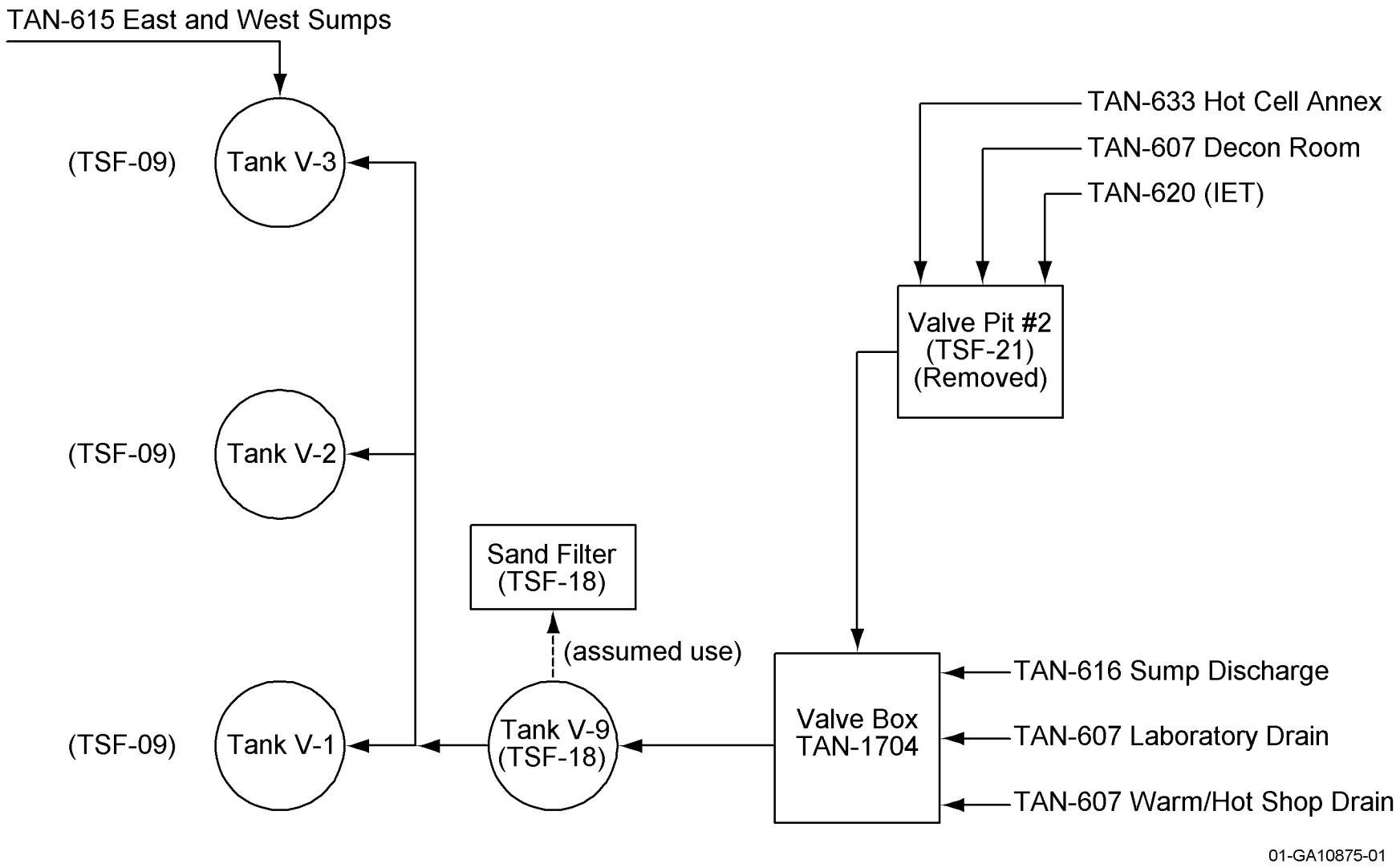


Figure 1-3. Primary waste sources and relationship among remedial sites.

semivolatile organic compounds (SVOCs) (e.g., polychlorinated biphenyls [PCBs]), and radionuclides (e.g., Cs-137, Co-60, Sr-90, and various isotopes of plutonium and uranium) (DOE-ID 1997; INEL 1994). The 1996 RI/FS sample results indicated potentially problematic levels of fissile materials in the tanks. In 1998, an evaluation of criticality issues associated with TSF-09 determined that there is not sufficient radionuclide mass in each of the V-1, V-2, and V-3 tanks to sustain a critical reaction (Blackmore 1998). Appendix H presents historical tank content characterization data.

Currently, TSF-09 is administratively controlled. The site is fenced and posted with signs that identify it as a CERCLA site. No activities can be performed at the site without contacting the INEEL Environmental Restoration directorate, and entry into the site requires radiological control precautions. The purpose of these controls is to keep worker exposures as low as reasonably achievable (ALARA) and to prevent the spread of contaminated soil (DOE-ID 1997).

1.2.2.2 **TSF-18, Contaminated Tank southeast of V-3.** TSF-18 includes a single conical-shaped sump tank (Tank V-9), V-9 tank contents, an aboveground sand filter, ancillary piping in the immediate vicinity of the tank, and surrounding contaminated soil. The abandoned underground storage tank is located in the open area between the TAN-616 and TAN-633 buildings and is adjacent to the southeast corner of TSF-09 (Figure 1-2).

Tank V-9 was installed in 1953 as part of the TAN radioactive waste collection system. The 1,514-L (400-gal) stainless steel sump tank is approximately 1.06 m (42 in.) in diameter in the center and extends approximately 2.1 m (7 ft) to the tip of the cone. The top of V-9 is approximately 2.1 m (7 ft) below ground surface (bgs) and is accessible by a 15.2-cm (6-in.) diameter riser that extends to ground surface. A baffle is located in the tank near the inlet ports. Tank V-9 has two subsurface inlet lines that received wastewater from several TAN sources via the TAN-1704 valve pit. One subsurface outlet line discharged overflow from Tank V-9 to Tanks V-1, V-2, and V-3 (Appendix A).

The 1996 RI/FS estimated that approximately 750 to 950 L (200 to 250 gal) of sludge and 265 L (70 gal) of liquid remain in the conical tank. The volume of material located behind the baffle is not known. The total volume of waste in the tank is estimated at 1,216 L (320 gal) (Blackmore 1998).

Results of the sampling and analysis of Tank V-9 conducted during the 1996 RI/FS indicate the contents of V-9 are of similar chemical nature to those of Tanks V-1, V-2, and V-3. The sample results reported high concentrations of organic compounds (e.g., trichloroethene and PCBs) and radionuclides (e.g., Cs, U, Am, Pu, and tritium). Because of the high concentration of fissile materials in the tank, a criticality evaluation was conducted in 1998. The evaluation recommended that additional sampling be conducted to adequately assess criticality issues (Blackmore 1998). Eight samples were collected from Tank V-9 in April 2001; three of those samples were collected from behind the baffle. The data evaluation resulting from that sampling effort is included as Appendix G. Appendix H presents the historical sample results of Tank V-9.

The sand filter located adjacent to the south side of the V-1 metal riser culvert is a component of TSF-18. The sand filter was apparently used to remove particulates from the Tank V-9 effluent. The filter is an aboveground concrete box containing approximately 19 L (5 gal) of material. The material in the sand filter is reported to resemble potting soil in color and texture. The concrete box has outer dimensions of approximately 1.5 m (5 ft) wide by 1 m (3 ft) deep by 1 m (3 ft) high. The concrete walls are 10 to 15 cm (4 to 6 in.) thick. The box resides on a concrete pad slightly wider than the outside dimensions. The anecdotal history of the structure indicates that it was used for only one day in 1970 before it became plugged. It has not been used since that time (DOE-ID 2000c).

The sand filter was sampled in March 1997. Results indicate the presence of PCBs and high concentrations of radionuclides (e.g., Co-60, Sr-90, Tc-99, Cs-137, U-234, and U-235) (Appendix H). Gross alpha and beta concentrations were 1.65×10^4 picocuries per gram (pCi/g) and 3.73×10^5 pCi/g, respectively (DOE-ID 2000c). A criticality evaluation performed on the sand filter contents determined that there is not sufficient U-235 present to pose a criticality concern (DOE-ID 2000c).

TSF-18 is administratively controlled. The site is included in the posted fenced area surrounding TSF-09. No activities can be performed at the site without contacting the INEEL Environmental Restoration directorate, and entry into the sites requires radiological control precautions (DOE-ID 1997).

1.2.2.3 Contaminated Soil. The AOC for the Group 2 sites is defined by the contaminated soil associated with TSF-09 and TSF-18 operations (Figure 1-4) (DOE-ID 1999). The surface and subsurface contaminated soil resulted from spills that occurred when waste was transferred to and from the tanks during the waste disposal system operations. Additional contamination may have originated from runoff from the adjacent cask storage pad. Anecdotal information indicates that disposal of weed control chemicals may also have contaminated the area (INEL 1994).

A specific pumping event in 1982 accidentally released approximately 6,435 L (1,700 gal) of tank liquids onto the ground surface. The leaked liquid accumulated in a depression along the west side of the tanks and flowed north out of the controlled radiological area through a shallow ditch (Figure 1-4). Cleanup operations removed approximately 3.8 m^3 (128 ft^3) of radioactive soil in a 0.9-m^2 (10-ft^2) area north of the tanks and outside the posted radiological control zone, and the excavation was backfilled with clean soil (INEL 1994).

Four soil sampling events have been conducted at TSF-09 and TSF-18. Appendix H presents tabulated analytical results and maps of sample locations. During 1980 and 1983, soil samples collected as part of a decontamination and decommissioning project confirmed that high concentrations of radionuclides were present in the shallow soils surrounding the V-Tanks (INEL 1994). In July 1988, the DOE conducted an environmental survey of the INEEL. The survey collected soil at TSF-09 from three boreholes advanced to a depth of 0.3 to 0.6 m (1 to 2 ft). Samples were analyzed for VOCs, SVOCs, metals, and beta/gamma activity. Analytical results for the VOC and SVOC analyses were nondetect. Total metals analysis reported slightly elevated levels of mercury and beryllium (INEL 1994). During the 1993 Track 2 investigation for TSF-09 and TSF-18, three boreholes were advanced to depths from 2.5 to 7.3 m (8 to 24 ft). Samples were analyzed for radionuclides and organic and inorganic constituents. Based on the results of the investigation, the soil is contaminated with radionuclides (e.g., elevated levels of beta activity, Cs-137, Co-60, and Sr-90) and low concentrations of organic constituents (e.g., trichloroethene and PCBs) (INEL 1994). Additional sampling was conducted in 1998 to provide specific data to support waste classification of the soil. Twelve samples were collected from four boreholes. Three boreholes were drilled to a depth of 3 m (10 ft), and the fourth location was advanced to a depth of 6 m (20 ft). Soil samples were analyzed for PCBs, VOCs, and toxicity characteristic leaching procedure (TCLP) metals (DOE-ID 1998). Analytical results were generally not detected and below the RCRA-regulated TCLP and land disposal restriction (LDR) concentrations (Hain 1998).

The soil sampling efforts provide data regarding the nature of the contaminants; however, the horizontal and vertical extent of soil contamination is not fully identified. The extent is conservatively estimated based on sampling, radiation surveys, and geologic features. The horizontal extent is estimated to encompass an area of 15.2 by 24.4 m (50 by 80 ft). Vertical extent of contamination is known to extend to a depth of 6.7 m (22 ft) (DOE-ID 1997).

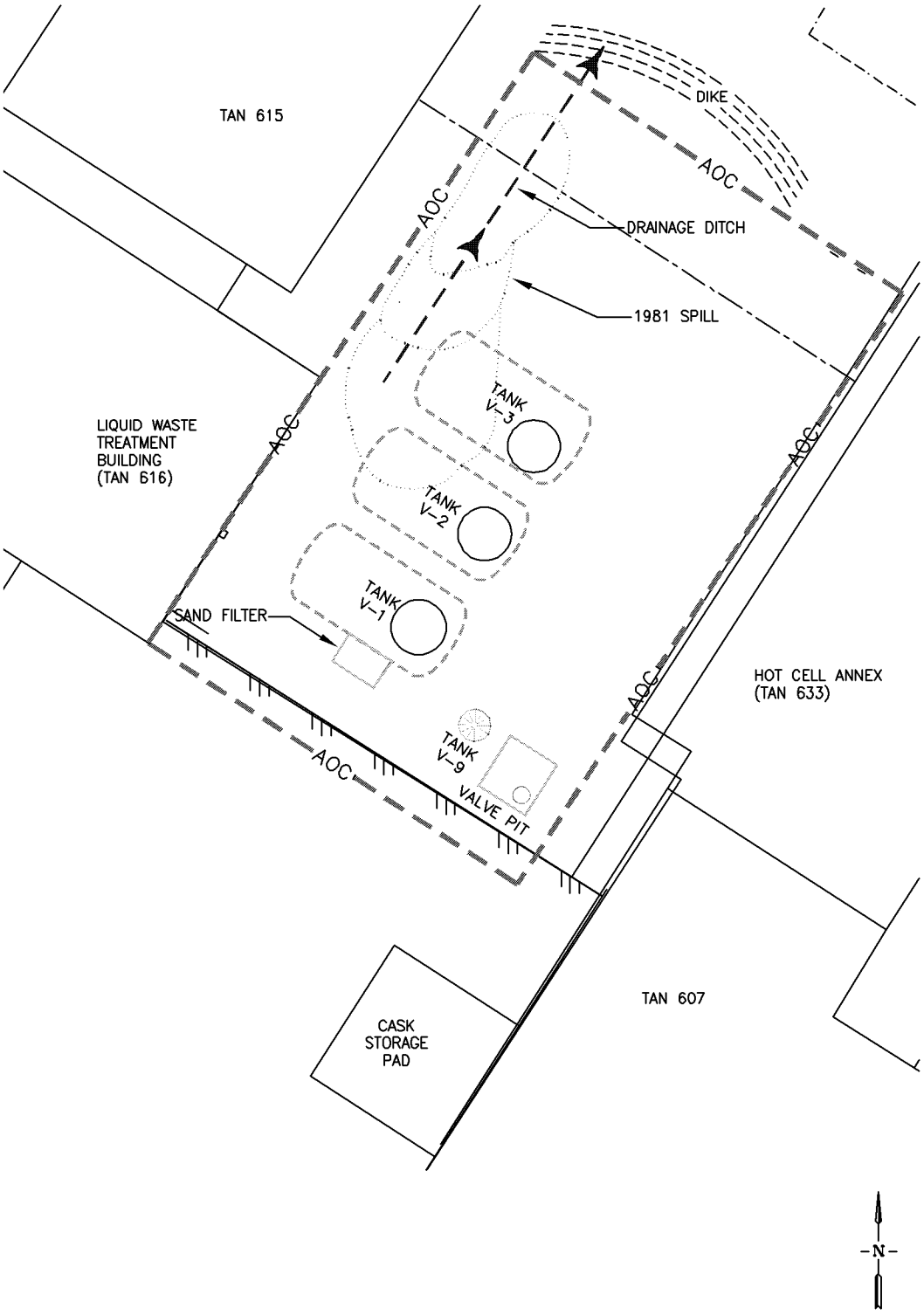


Figure 1-4. Area of contamination and site structures.

Although a recommendation was made in the early 1980s to remove all radioactively contaminated soil from the sites, there are no indications that the removal was conducted. Additional soil has been added to the area over the past 20 years as a cover to contain the radioactivity and reduce the potential for offsite migration. Contaminated soil may be buried 0.3 to 0.6 m (1 to 2 ft) below current ground surface. Previously, surface water flowed from the TSF-09 site into a drainage ditch flowing north from the site. The drainage ditch was blocked in 1981 following an accidental release from the pumping operations.

1.2.2.4 **Non-CERCLA Components.** Several non-CERCLA components of the intermediate-level waste disposal system are located within the boundary of the AOC. As shown in the remedial design drawings (Appendix A, Sheet 7 of 20, Pipe Removal Plan), the TAN-1704 valve pit, a segment of the associated influent lines, and additional piping that may impede access to the Group 2 sites will be removed under this CERCLA RD/RA WP, but will be managed in accordance with the RCRA VCO. Removal of VCO components will be funded from the INEEL VCO program.

The TAN-1704 valve pit was installed in 1953 to receive wastewater from the original TSF facilities. The unit became inactive in the late 1980s. The valve pit contains piping and valves that transferred low-level radioactive wastewater from the TSF facilities to Tank V-9, and later to TAN-666. The valve pit received wastewater from four influent lines. These lines were from the TAN-616 evaporator pit sump and pump room sump, TAN-607 laboratory drain, TAN-607 Warm/Hot Shop, and TSF-21 Valve Pit #2 (Figure 1-3). The lines from TAN-616 were cut and capped within the valve pit in 1991. The TAN-607 lines have remained open. However, the valves are closed at the valve pit, and material may have backed up in the lines. Two effluent lines from the TAN-1704 valve pit drained to Tank V-9 (TSF-18). These lines were cut and rerouted to TAN-666, while the two pipes to V-9 were capped within the valve pit in 1991. Outside the valve pit, the effluent lines are designated as part of the CERCLA-managed TSF-18 (INEEL 2001a).

The internal dimensions of the concrete valve pit are 1.5 m (5 ft) by 1.6 m (5.3 ft) by 2.9 m (9.5 ft) in depth. Access to the valves is via a manhole. The calculated internal volume of the valve pit is 7,170 L (1,895 gal). Approximately 0.3 m (1 ft) of liquid (approximately 760 L [200 gal]) was noted in the base of the valve pit during the 2000/2001 Decontamination and Dismantlement/VCO characterization effort. The liquid was presumed to be from precipitation. A liquid sample was collected and analyzed for total VOCs, TCLP VOCs, TCLP inorganics, TCLP SVOCs, PCBs, and radionuclides. With the exception of estimated trace values reported for trichloroethene and 2-hexanone, the sample results indicate that the liquid contains only radionuclides (Ce-144, Cs-137, Co-60, Sr-90, and gross beta activity) (INEEL 2001b).

1.3 Selected Remedy Implementation Approach

The Agencies have selected the remedy for the OU 1-10 V-Tank site addressed in this RD/RA WP based on CERCLA requirements, the detailed analysis of alternatives, and public comments. The remedy, as selected in the 1999 ROD and augmented by the 2001 ESD, is soil and tank removal, ex situ treatment of tank contents, and disposal of the tanks, tank contents, and ancillary piping and equipment.

This section describes the general approach to be implemented for the remedial action of the V-Tanks. Details of the remedial action implementation are located in Section 6.

The major components of the selected remedy for the V-Tanks include:

- Removal of tank contents, which includes separation of liquid and sludge phases
- Onsite treatment of liquid

- Storage of sludge onsite pending shipment to an offsite Treatment, Storage, and Disposal Facility (TSDF)
- Excavation and removal of the tanks, piping, and ancillary equipment
- Characterization of removed material for waste disposal
- Disposal of the removed structures and contents
- Disposal of contaminated soil excavated to remove the tanks
- Disposal of some waste streams to an onsite repository
- Confirmatory soil sampling at the base of the tank excavations
- Backfilling the tank excavation with clean soil, pending confirmatory sampling results
- Further characterization of horizontal and vertical extent of soil contamination in the area surrounding TSF-09 and TSF-18 and migration pathways
- Additional excavation of contaminated soil as identified by the characterization effort until the remediation goals have been met
- Confirmatory sampling at the base of excavations
- Disposal of contaminated soil
- Backfilling the excavated areas with clean soil, contouring and grading the area to provide appropriate site drainage
- At the completion of the remedial action, revised institutional controls consisting of signs, access control, and land use restrictions may be established and maintained, depending on the results of the confirmatory sampling.

1.4 Pre-Remedial Action Sampling (V-9 Criticality Evaluation)

In 1998, an evaluation of the criticality issues associated with Tank V-9 was performed. The evaluation was not conclusive in determining if the mass of fissile material was sufficient for a criticality event. Additional sampling was recommended. Based on that recommendation, eight samples were collected from Tank V-9 in April and May 2001 prior to remediation activities. Three samples were collected from behind the baffle along the inlet side of the tanks, two along the tank centerline, and three along the outlet side of the tank. Samples were analyzed for U isotopes, moisture content, bulk density, and TCLP metals (DOE-ID 2000c).

A report of the Tank V-9 sample results and analysis was prepared and is included as Appendix G.

A statistical evaluation was performed using the 2001 sample results to evaluate the concentration of U-235 and U-238 in each zone of the tank. The statistical analysis determined an upper bound of the mass of fissile material in each zone and estimated the total mass of U-235 and U-238 in the tank, using a 99% upper confidence limit (EDF-ER-325).The statistical analysis calculated less than one kilogram of

U-235 in Tank V-9. Following the statistical analysis, an evaluation of potential criticality safety issues was performed. The criticality analysis determined that several hundred kilograms of uranium would be the required minimum critical mass under the current configuration of Tank V-9. The criticality analysis concluded that there are no criticality safety issues associated with Tank V-9. Furthermore, an evaluation of the planned Tank V-9 contents removal and storage approach, presented in this RD/RA WP, was performed. The remedial action for Tank V-9 was determined to not pose a criticality concern (Nielsen 2001).

2. DESIGN BASIS

This section identifies the objectives that govern the remedial design. This includes the objectives defined by the ROD, the major components required in the remedy to meet the ROD objectives, and the bounding INEEL objectives. Standards, requirements, and codes incorporated in the design to meet these project objectives are also presented.

2.1 Remedial Action Objectives

The remedial action objectives (RAOs) for OU 1-10 are developed in accordance with the *National Oil and Hazardous Substances Pollution Contingency Plan* (EPA 1990) and CERCLA RI/FS guidance (EPA 1988) and defined through discussions with the Agencies. The RAOs are based on the results of the human health risk assessment and are specific to the COCs and exposure pathways developed for OU 1-10. To meet the OU 1-10 RAOs, final remediation goals (FRGs) for the COCs were established to ensure a risk-based protectiveness of human health and the environment providing unrestricted land use in 100 years. These goals are quantitative cleanup levels based on ARARs and risk-based doses.

As outlined in the OU 1-10 ROD (DOE-ID 1999), the RAOs for the V-Tanks were established. The RAOs for the soil pathway were established only for Cs-137 because it was the risk driver. The ROD RAOs for the V-Tanks are:

- Reduce risk from external radiation exposure from Cs-137 via the soil pathway to a total excess cancer risk of less than 1 in 10,000 for the hypothetical resident 100 years in the future and the current and future worker
- Prevent release to the environment of the V-Tank contents.

2.2 Remedy Performance Objectives

Remedy performance objectives for the V-Tanks have been identified as part of this RD/RA WP to achieve and augment the RAOs. The remedy performance objectives will be conducted in compliance with the ARARs presented in Section 5.

The remedy performance objectives include:

- Removal of the tank contents, tanks, and ancillary lines/equipment
- Removal of the VCO-managed components within the site
- Characterization of the base of the excavations to determine if releases from the tanks, piping, and ancillary equipment to the environment have occurred
- Characterization of the nature and extent of soil contamination in the area surrounding the V-Tanks
- Removal of contaminated soil above the FRG for Cs-137 (23.3 pCi/g)
- Removal of RCRA-hazardous constituents above remediation goals to facilitate RCRA closure
- Characterization, treatment as required, and disposal of the generated waste.

2.3 Design Objectives

Design objectives have been identified as part of this RD/RA WP to address project-specific constraints. The design objectives for the RD/RA include:

- Buildings surrounding TSF-09 and TSF-18 must not be damaged. The design should demonstrate and ensure that the surrounding structures will not be affected by the remedial action.
- The RD/RA should be a complete solution, taking into consideration all facets of the remediation to provide a cost-effective remedy.
- Waste acceptance criteria (WAC) for TSDFs and waste transportation requirements will be considered throughout all elements of the design.
- The remedial action will be conducted in two field efforts, the tank removal and further soil removal surrounding the V-Tanks. Under the initial effort (tank removal), the design should minimize the volume of contaminated soil removed from the site.
- Techniques to minimize the volume of waste generated will be used when health and safety and cost considerations are not compromised.
- The design should provide for contingencies and changing conditions that may occur during the remedial actions.
- Prevent the spread of contamination by establishing engineering controls and operating procedures.

2.4 Regulatory Requirements

A detailed discussion of the ARARs is presented in Section 5 of this work plan.

2.5 DOE Related Orders and Standards

- DOE Order 231.1, "Environment, Safety, and Health Reporting"
- DOE Order 232.1A, "Occurrence Reporting and Processing of Operations Information"
- DOE Order 414.1A, "Quality Assurance"
- DOE Order 435.1, "Radioactive Waste"
- DOE Order 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees"
- DOE Order 470.1, "Safeguards and Security Program"
- DOE Order 5400.5, "Radiation Protection of the Public and Environment"
- DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards"
- DOE Standard 1090, "Hoisting and Rigging Devices."

2.6 Industrial Standards

The following list contains industrial standards for specific remedial action work elements:

- EPA, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846),* Third Edition, Final Update III, dated December 1996 (or most recent)

- ASME, NQA-1-1994, Quality Assurance Requirements for Nuclear Facility Applications per Form 414.12B, ASME NQA-1 Applicability Matrix.

Additional industrial standards for specific remedial action work elements are cited in the appropriate specifications in Appendix B.

2.7 INEEL Requirements and Documents

The following list contains INEEL requirements and documents that are applicable to the remedial design:

- DOE-ID, 1998, *INEEL Stormwater Pollution Prevention Plan for Construction Activities,* DOE/ID-10425(98), http://ea.inel.gov/indappl/swppp/swppp-ca.pdf or http://www.inel.gov/x-web/other/framed.shtml?/publicdocuments/pdfs/stormwatermay98.pdf

- MCP-7, "Radiological Work Permit," *Manual 15B-Radiation Protection Procedures*

- MCP-62, "Waste Generator Services–Conditional Industrial Waste Management," *Manual 17-Waste Management*

- MCP-69, "Waste Generator Services–Hazardous Waste Management," *Manual 17-Waste Management*

- MCP-70, "Waste Generator Services–Mixed Low-Level Waste Management," *Manual 17-Waste Management*

- MCP-124, "Response to Abnormal Radiological Situations," *Manual 15B-Radiation Protection Procedures*

- MCP-187, "Posting Radiological Control Areas," *Manual 15B-Radiation Protection Procedures*

- MCP-227, "Sampling and Analysis Process for CERCLA and D&D Activities," *Manual 18-Closure Management*

- MCP-230, "Environmental Restoration Document Control Interface," *Manual 18-Closure Management*

- MCP-231, "Logbooks," *Manual 18-Closure Management*

- MCP-241, "Preparation of Characterization Plans," *Manual 18-Closure Management*

- MCP-244, "Chain of Custody, Sample Handling, and Packaging for CERCLA Activities," *Manual 18-Closure Management*

- MCP-425, "Radiological Release Surveys and the Disposition of Contaminated Materials," *Manual 15B-Radiation Protection Procedures*
- MCP-540, "Documenting the Safety Category of Structures, Systems, and Components," *Manual 10A-Engineering and Research*
- MCP-557, "Managing Records," *Manual 1-General Administration and Information*
- MCP-2714, "Safety Signs, Color Codes, and Barriers," *Manual 14A-Safety and Health–Occupational Safety and Fire Protection*
- MCP-2742, "Temporary Facilities," *Manual 14A-Safety and Health-Occupational Safety and Fire Protection*
- MCP-2783, "Startup and Restart of Nuclear Facilities," *Manual 9-Operations*
- MCP-2864, "Sample Management," *Manual 18-Closure Management*
- MCP-3449, "Safety and Health Inspections," *Manual 14A-Safety and Health–Occupational Safety and Fire Protection*
- MCP-3472, "Identification and Characterization of Environmentally Regulated Waste," *Manual 17-Waste Management*
- MCP-3475, "Temporary Storage of CERCLA-Generated Waste at the INEEL," *Manual 18-Closure Management*
- MCP-3562, "Hazard Identification, Analysis, and Control of Operational Activities," *Manual 9-Operations*
- PLN-114, "Emergency Plan/RCRA Contingency Plan," *Manual 16A-Emergency Preparedness*
- PRD-160, "Hoisting and Rigging," *Manual 14A-Safety and Health-Occupational Safety and Fire Protection*
- PRD-183, "Radiation Protection–INEEL Radiological Control Manual," *Manual 15A-Radiation Protection-INEEL Radiological Control Manual*
- PRD-1007, "Work Coordination and Hazard Control," *Manual 14A-Safety and Health-Occupational Safety and Fire Protection*
- PRD-2007, "Hoisting and Rigging," *Subcontractor Requirements Manual*
- PRD-2012, "Lockout and Tagout," *Manual 14A-Safety and Health-Occupational Safety and Fire Protection*
- PRD-2014, "Excavations and Surface Penetrations," *Manual 14A-Safety and Health-Occupational Safety and Fire Protection.*
- PRD-5006, "Subcontractor/Supplier Quality Plan," *Subcontractor Requirements Manual.*

- TPR-80, "Radioanalytical Data Validation," current revision.

3. UNCERTAINTY MANAGEMENT

This section describes the project approach to manage uncertainties that may arise during the course of the remedial design and remedial action for the V-Tanks. Unforeseen events may arise throughout the course of the project, as with the implementation of any remedial action.

In the event that the DOE-ID, EPA, or IDEQ identifies changes from the planned conditions during the execution of the remedial action, the other Agency project managers will be notified. Written concurrence on response actions from the other agencies will be needed for significant changes. Changes that would be considered significant include:

- Changes that affect RAOs of the ROD
- Cost changes that may cause the project cost estimate provided in the ROD to increase by 50% or decrease by 30%
- Changes that alter the intent and the final performance of the remedial design
- Changes that significantly impact project milestones.

An objective of the remedial action is to minimize unforeseen events to ensure smooth implementation of the remedy. As part of the remedial design, several possible events have been analyzed and an approach developed for each to manage the uncertainty. The project uncertainties that have been analyzed are:

- Timing for Tank V-9 criticality results
- Criticality uncertainty for Tank V-9
- Tank V-3 overflow prevention
- Sludge interim storage at the INEEL
- Schedule contingencies
- Off-Site treatment facility for sludge.

3.1 Timing for Tank V-9 Criticality Results

Post-ROD sampling of Tank V-9 was conducted in spring 2001 to obtain sufficient data to perform a criticality analysis. The data from the Tank V-9 sampling were not available as part of the draft final submittal to EPA and IDEQ. The validated data results and criticality evaluation are now incorporated as Appendix G in the draft final submittal of this Group 2 RD/RA WP.

3.2 Criticality Uncertainty for Tank V-9

This Group 2 RD/RA WP design for removal of Tank V-9 contents is based upon an assumption that the contents of Tank V-9 do not pose a criticality concern. This assumption is based upon the results of past tank sampling that indicates criticality is not likely. Additional samples on the inlet side of the tank baffle were collected and generated data used to perform a criticality evaluation, based upon the

U-235 quantity in the tank contents. In the event that the criticality evaluation determined the contents of Tank V-9 pose a criticality concern, this Group 2 RD/RA WP would be finalized to implement the remedial action for Tanks V-1, V-2, and V-3. An addendum to this Group 2 RD/RA WP would be prepared to address the design and remedial action implementation for Tank V-9 to ensure criticality safety during field activities. The preparation of the addendum would require additional planning, which would significantly delay the schedule and increase the costs for the Tank V-9 contents removal. As described in Section 1.4, results of the criticality analysis determined that Tank V-9 does not pose a criticality concern. Therefore, criticality uncertainty is no longer a project risk.

3.3 Tank V-3 Overflow Prevention

Tank V-3 has experienced a level increase during the spring season of each year since at least 1996, based upon data collected by the TAN facility and maintained by WAG 1. Anecdotal information prior to 1996 indicates that the level of Tank V-3 increased consistently during the spring season. Maintenance measures were implemented by WAG 1 during calendar year 2000 to mitigate the annual inflow to Tank V-3. The measures included:

- Obtained video and photographs of the Tank V-3 manhole and interior of Tank V-3 to identify potential sources of inflow to the tank
- Installed a new gasket with rubberized sealant to seal the Tank V-3 manhole cover to the tank flange
- Installed a metal band around the Tank V-3 manhole cover to provide additional seal of manhole cover
- Placed clean soil around the Tank V-3 access riser to level low spots and prevent localized ponding of surface water
- Installed downspout tubing on nearby roof gutters to minimize stormwater runoff and snowmelt into the area.

The schedule presented in this Group 2 RD/RA WP indicates that removal of the V-Tank contents will commence during 2002. There is a slight potential that the level of V-3 could rise prior to implementation of the selected remedy to a depth that requires more immediate overflow prevention measures. This Group 2 RD/RA WP includes an overflow prevention design, included as Appendix I, that can be implemented to ensure no overflow of Tank V-3 contents. This design has been developed to serve as a stand-alone working document, in the event that the Agency WAG managers determine that the preventative measures should be implemented prior to commencement of the remedial action.

3.4 Sludge Interim Storage at the INEEL

This Group 2 RD/RA WP details the separation of V-Tanks sludge and liquid. The separation will minimize the amount of waste that requires treatment at a RCRA/Toxic Substances Control Act (TSCA) compliant TSDF. One treatment facility that has been identified for the treatment of V-Tanks sludge is Allied Technology Group (ATG) in Richland, Washington. Currently, the WAC at ATG will not allow receipt of all V-Tank sludge at one time, and several shipments to ATG may be necessary to treat all the V-Tank sludge. Each waste shipment must be treated and transported to the final disposal facility prior to accepting a new shipment of V-Tank sludge under the existing WAC. In the event that several shipments will be required, interim storage of V-Tank sludge at the INEEL will be required.

As part of the V-Tanks remedial action, the INEEL will pursue a project-specific variance that will allow receipt and treatment of all V-Tank sludge at the TSDF at one time. However, as part of uncertainty management, interim storage at the INEEL for V-Tank sludge is necessary. It is anticipated that the interim storage for the V-Tank sludge is required for approximately two years. The *Waste Management Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1* (INEEL 2001d), as agreed to by the Agencies, will describe the sludge interim storage.

3.5 Schedule Contingencies

Content removal is currently scheduled to begin in 2002. To support the planned start of content removal, it may be beneficial to begin certain site preparation activities before the RD/RA WP becomes final. The Agencies agree that site preparation may begin after completing comment resolutions on the draft final RD/RA WP. All site preparation activities must ultimately meet the requirements in the final RD/RA WP.

3.6 Off-Site Treatment Facility for Sludge

As noted in Section 3.4 above, ATG has been identified as the planned offsite treatment facility for V-Tanks sludge. However, ATG currently is not permitted to accept V-Tanks sludge. If ATG is unable to obtain the necessary permit by approximately April of 2002, they may be unable to accept the V-Tanks sludge for treatment in the fall of 2002. This could prolong the currently planned two-year timeframe for onsite interim sludge storage of V-Tanks sludge. Because of this uncertainty, other potential offsite treatment facility options will continue to be explored and monitored for availability for treatment of the V-Tanks sludge.

4. REMEDIAL DESIGN

This section in the remedial design is presented in terms of the design assumptions, design criteria, technical elements, and quality assurance.

4.1 Design Assumptions

The following general assumptions are limiting factors and conditions under which the remedial design for the Group 2 sites was developed.

- There are no criticality issues associated with the V-Tanks and the remedial activities described in this RD/RA WP.
- No groundwater will be encountered during tank or contaminated soil excavation.
- Historical sample data are representative of the physical properties of the sludge and the contamination to be encountered in all media.
- The tank locations, orientations, and dimensions are as presented in INEEL engineering drawings.
- Tanks are made of ¼-in. thick stainless steel, and the structural integrity is intact.
- The depth of excavation will be to the spring line of the tanks.
- The top of Tank V-9 is 7-ft bgs. The base of the tank is approximately 14-ft bgs.
- Piping and utilities are as presented in available INEEL engineering drawings.
- Piping to be removed is stainless steel, and the structural integrity is intact.
- The tank sludge has not hardened to a cement-like form; the sludge can be suspended in water by mechanical action or low-intensity shear forces.
- Onsite average dry soil density is 95.5 pounds per cubic foot.
- Disposal facilities will be available for all waste streams that will be generated.
- Sludge disposal facility (ATG) will limit Sr-90 to less than or equal to 4 curies of activity per package.
- If the limitations for Sr-90 are met, then limitations that the sludge disposal facility (ATG) has for other radionuclides will also be met.
- Shipping cask requirements will limit the amount of fissile material to less than 15 grams per container.
- Envirocare's waste acceptance criteria are representative of radionuclide disposal requirements for determining the level of treatment required for contaminated water.

4.2 Design Criteria

The design criteria provide the framework and basis for the technical design elements necessary to achieve the remedial action. The sizing and design of the technical elements are controlled by the design criteria. The design criteria associated with TSF-09, TSF-18, and the non-CERCLA components are as follows.

- **Stormwater.** A two-year, 24-hour storm event will be used for sizing onsite runoff and offsite run-on flow control structures and for establishing the amount of contaminated runoff that will require management. A 25-year, 24-hour storm event will be used for sizing secondary containment structures.

- **Shoring Loading.** All shoring used for earthwork must have a minimum capacity of 671 pounds per square foot (Appendix C, ABQ05-CE001).

- **Secondary Containment.** Secondary containment areas must be able to contain a 25-year, 24-hour storm plus either 100% of the largest container or 10% of the total container volume, whichever is greatest (Appendix C, ABQ08-CE004).

- **Personnel Dose Limitations.** The dose rate goal for general work areas outside of high radiation zones is less than 10 mR/hr. Personnel and project ALARA goals will be established by a radiological engineer.

- **Waste Packaging.** Department of Transportation requirements specified in 49 Code of Federal Regulations (CFR) Subchapter C, Hazardous Materials Regulations, will be met. Maximum activity for Sr-90 will be 4 curies per package to satisfy the current sludge disposal facility's (ATG) restriction.

- **Water Treatment.** Treated water must meet land disposal restrictions and the disposal facility's waste acceptance criteria before solidification.

4.3 Technical Elements

The technical elements of the design represent the physical components of the design that are required to be in place and functional during the remedial action. Detailed drawings, specifications, and calculations supporting the design are located in Appendices A, B, and C, respectively. A description of each major technical element and its respective function follows.

4.3.1 Onsite Drainage Control

Onsite drainage control is designed to control contaminated water within the contaminated area and restrict contaminated water from running offsite. A containment berm around the perimeter of the contaminated area will restrict offsite flows. Stormwater will be allowed to collect in multiple areas onsite in an attempt to limit the amount of stormwater that will have to be managed; therefore, no focused collection point for onsite stormwater has been designed. Any onsite runoff that collects at the berm and in other areas of the site, and that does not infiltrate into the ground within 24 hours of the storm event, will be pumped and stored onsite for subsequent treatment, as required.

4.3.2 Offsite Drainage Control

Offsite drainage control is designed to restrict offsite stormwater from running across the contaminated site and becoming contaminated. Restricting the amount of stormwater run-on minimizes the amount of contaminated water that must be managed. Protective controls include gutters and drain spouts installed on all building roofs that drain onto the site. Drain spouts will be extended to direct stormwater outside of the controlled contamination area. Perimeter control ditches will direct stormwater run-on around the site. Stormwater that cannot be diverted around the site will be directed through the site in a buried 21-in. corrugated metal culvert so the water does not become contaminated.

4.3.3 Access Control

A 6-ft high perimeter fence will control access to the site so only trained and authorized personnel are able to access the contaminated site. All personnel will access the site and leave the site through access controls that will be set up. Equipment access will be through the north end of the site. Equipment used onsite during the remediation is expected to remain onsite until remediation is complete. An additional access control point at the southeast corner of the site will allow access to the stack designated as TAN-734 for maintenance purposes. This access is expected to be needed on a limited basis. Any personnel using this access control point will come through the access control point first and obtain the appropriate personal protective equipment.

High radiation areas in the drum and high-integrity container (HIC) storage areas will be controlled with an additional 6-ft high perimeter fence so that only the necessary personnel have access to these areas. The AOC boundary around the V-Tanks establishes the boundary within which hazardous material contamination needs to be controlled so that it is not spread to other areas of the contaminated site. The northern end of the boundary is the point where all visible hazardous contamination will be removed from personnel and equipment before access to the rest of the site can be obtained.

4.3.4 Drum Storage/Water Storage/Decontamination Area

The Drum Storage/Water Storage/Decontamination Area provides the secondary containment necessary for the dewatered sludge drums and the contaminated water that will be stored in this area. Shielded overpacks will be installed over the dewatered sludge drums. The use of shielded overpacks for the drums will allow this area to be only a radiation area. Drums will be transferred to interim storage as soon as practical to minimize exposure rates and maintain site dose rate ALARA. The area will serve a dual purpose at the end of the remediation and will function as the equipment decontamination area. A concrete sump within this area will provide the secondary containment for decontamination water that is collected and will be pumped, as required, during decontamination activities.

4.3.5 HIC Storage/Drum Filling, Staging Area

The HIC Storage/Drum Filling Staging Area will be considered a high radiation area. It provides the secondary containment and the area necessary to store HICs. It also provides the operational area necessary to allow for sludge transfer from the HICs to the drums and subsequent dewatering of the drums before moving them to the drum storage area.

4.3.6 Soil Bag/Debris/Tank Storage Area

The Soil Bag/Debris/Tank Storage Area provides the space where filled soil bags or rolloffs, containerized debris, and empty V-Tanks will be stored prior to transfer to a disposal facility. Soil bags will be stacked up to three in this area. Secondary containment will not be required for this area because

no liquid waste will be stored in this area. This area will be considered a radiation area or radioactive material storage area and will be controlled only with a 4-ft access control fence to designate the boundaries of the storage area.

4.3.7 Radiation Shielding

Radiation shielding will be provided around the perimeter of the high radiation areas to limit the dose exposure in the general work areas. Shielding equivalent to 10 in. of concrete is expected to be required and will be provided, as required, to limit dose exposures to within the design criteria. Filled soil bags, rolloffs, or concrete blocks are examples of shielding that can be used. Sludge drums will be stored in lead-shielded overpacks.

4.3.8 Shoring

Shoring (trench shielding or trench boxes) or side sloping will be required for all excavations that exceed 4 ft in depth to protect workers from soil cave-ins. Premanufactured trench shields will be used to provide the shoring protection, as required, for the excavation of the V-1, V-2, V-3, and V-9 tanks. The shoring for the tanks will remain in place after the tank removal to allow soil sampling and analysis to occur and will then be removed during backfill operations. Shoring will not be left in place for the utility line excavations.

4.4 Process Description

The process for removal of water and sludge from four V-Tanks is presented in Figures 4-1 through 4-5. This process, including treatment of the water faction, is illustrated in Figure 4-1. The sludge will then be transferred to drums and dewatered, with the water being removed and treated as illustrated in Figure 4-3. The treated water from these steps will be collected in storage containers. The design anticipates this water will be acceptable for disposal, but if testing indicates otherwise, the water will be retreated as illustrated in Figure 4-5. Each of these processes is described in further detail in the following sections.

4.4.1 V-Tank Sludge Removal/Water Treatment

This is a three-step process as shown in Figure 4-1. First, the excess water from Tank V-3 will be removed and treated. Second, the sludge contents of the V-Tanks will be removed and placed in the sludge HICs. This will be done using a self-priming peristaltic pump with a moveable suction line. Water will be recycled under pressure to the respective V-Tank, as needed, to fluidize the sludge solids and aid in their removal. In the third step, the water that remains in the tanks after the sludge removal will be treated through the sequence of units shown. Water removed from the tanks during this third step will only pass through the treatment train one time.

Figure 4-2 presents a mass balance for each of the V-Tanks showing flow rates, volumes, and contaminant concentrations for each step through the process. The stream numbers shown in the diamonds correspond to the columns in the mass balance tables. Each is further described as follows:

- No. 1 is the transfer of sludge and water from the V-Tank to the sludge HIC.
- No. 2 is the transfer of water from the sludge HIC to the oil and grease filter.

- No. 3 is the flow of water from the oil and grease filter to the first stage granular-activated carbon (GAC) unit. Oil and grease content have been reduced to ≤1 mg/L and total suspended solids (TSS) have also been reduced to ≤5 mg/L.

- No. 4 is flow from the 1st to the 2nd stage GAC unit. It shows various organics have been reduced, TOC has been reduced by 95%, and oil and grease have been reduced to <0.1 mg/L.

- No. 5 is the flow from the 2nd stage GAC unit to a bag filter. It shows additional removal of individual organics to <0.01 mg/L and TOC to <0.5 mg/L.

- No. 6 is flow from the bag filter to the ion exchange unit. The bag filter traps carbon fines that may wash through the GAC units.

- No. 7 is flow from the ion exchange unit to the day tank. It shows 95% removal of the heavy metals and a greater than 90% reduction in radioactivity. Incidental removal of heavy metals and radioactivity may have occurred in the upstream units, but all removal has been assumed to occur in the ion exchange unit.

- No. 8 represents treated water flowing to the water HIC.

- The bypass allows untreated water to be returned to the V-Tank to aid in pumping out the sludge and will be used on an as needed basis.

In the case of Tank V-1, the first column shows that the average pumping rate is estimated to be 10 gpm, and the total volume to be removed is 1,684 gal. Sampling results show that two metals and two VOCs exceed the LDR treatment standards. The TOC listed is the measured TOC and includes the summation of other detected organic compounds that were less than the LDR standards and the semivolatiles at detection limits that exceed the LDR standards. The remainder of the table represents the contaminant levels at each step of the water treatment process. For the equipment selected, the flow rate is limited to 10 gpm per treatment train, and the total volume to be treated is 644 gal, based on the assumption that 520 gal of water will remain with the sludge to create a 50/50 mixture of sludge/water in the sludge HIC.

The sludge HIC is equipped with a filter with a pore size equivalent to 10 μm that will retain suspended particles and prevent clogging of downstream units. The first filter, F1, will absorb any oil that may be present and provide additional removal of suspended solids. The next two units, CH, are 55-gal granular-activated carbon (GAC) adsorbers to remove organic contaminants. Published isotherms (found in the *EPA Treatability Manual*, EPA-600/8-80-042a) were used to estimate carbon consumption. The GAC isotherms give the quantity of contaminant adsorbed per unit of carbon for a given residual remaining in the water. The units are typically milligrams of adsorbed contaminant per gram of carbon. In the case of TCE for a residual 0.01 mg/L, 2 mg is adsorbed per gram of GAC, or 0.002 lb/lb of GAC. A total of 644 gal of water containing 0.16 mg/L of TCE represents 0.859 (10^{-3}) lb of TCE, and dividing by 0.002 gives 0.43 lb of GAC consumed to treat this water. For PCE, the consumption factor is 0.0038 lb/lb of GAC at 0.01 mg/L, and 0.20 lb of GAC will be consumed in removing this contaminant. The other organics were estimated to consume 0.40 lb GAC and the remaining TOC was estimated to consume 25.13 lb of GAC. This is a simplified but conservative approach to what happens in a GAC column with water flowing through it. The residual of 0.01 mg/L was selected at well below the LDR standard and with 165 lb of GAC in each unit, the effluent from the first will be 0.02 mg/L or less for each contaminant and <0.01 mg/L after the 2nd stage unit.

Ion exchange was selected to remove heavy metals. A standard water softener using cationic resin regenerated with salt is suitable for this application. The ionic loading is primarily from calcium, magnesium, and potassium. Since the resin is in the sodium form, sodium in the water will have no impact on the resin. However, the relatively low concentrations of the heavy metals of concern will be efficiently removed because the resin has much higher affinity for these metals. The mass balance shows a conservatively estimated removal of 95% for the metals of concern. Cationic radionuclides will also be removed. Converting those present above the detection level to mg/L concentrations shows uranium to be less than 0.9 mg/L, and all the others combined are less than 0.0001 mg/L. Ion exchange resin has a strong affinity for high molecular weight ions, so these ions will be, essentially, completely removed and the radioactivity due to the strontium-90 and cesium-137 are conservatively estimated to be reduced 90%. Ion exchange loading is expressed as calcium carbonate ($CaCO_3$) equivalents. The loading for the water from Tank V-1 is 2.042 lb as $CaCO_3$ including 0.002 lb from radionuclides.

The process for Tank V-2 is similar to that described for Tank V-1. The volume of water to be treated is 556 gal, and it contains only TCE at a level above the LDR standard. GAC consumption for treating the TCE is 0.67 lb, and the estimated quantity for the other organics above detection limits is 1.5 lb. GAC consumption for the remaining TOC is 34.53 lb. The ion exchange loading is 1.804 lb as $CaCO_3$ with 0.004 lb from radionuclides.

For Tank V-3, the water volume treated is 6,995 gal with TCE the only contaminant above the LDR standard (Figure 4-2). Carbon consumption for TCE treatment will be 5.8 lb and approximately 13.0 lb for other organics above detection limits. The remaining TOC will consume 434.32 lb. After treating approximately 4,100 gallons of this water, the first stage GAC units from each train should be removed and new units installed in the 2nd stage. The ion exchange loading is 17,985 lb as $CaCO_3$ with 0.015 lb from radionuclides.

Tank V-9 contains more sludge than water, so water removed from the other tanks will need to be added to this tank to fluidize the sludge for removal. The water added will remain mixed with the sludge in the sludge HIC tank.

To summarize, water treatment associated with emptying the V-Tanks will consume a total of 516 lb of GAC and result in an ion exchange loading of 22 lb as $CaCO_3$.

4.4.2 Drum Filling/Water Treatment

Figure 4-3 shows the drum filling and water treatment process flow diagram along with the operating logic. Each sludge HIC will be subject to this operation. After a drum is filled with the sludge and water mixture, the water will be withdrawn and treated with the same equipment used previously for emptying the V-Tanks. A composite mass balance for this operation is presented in Figure 4-4. Although each sludge HIC will be processed separately, the mass balance for water treatment has been calculated as a composite. This results in a conservative estimate of GAC consumption as long as the Tank V-9 sludge with the higher concentrations is processed last. The total mixed volume is 3,706 gal, and the quantity of water extracted from the drums is 1,763 gal. To obtain the composite concentration of each parameter, the volume multiplied by the concentration for each sludge HIC was summed and the total divided by 3,706 gal to create a weighted average.

GAC consumption was calculated as described previously, except for three VOCs present at significantly higher concentrations. For TCE, 1,1,1-TCA, and methylene chloride, the calculation was done step-wise to simulate the removal process in a flow-through system. When a high concentration enters the bed, the top layer reaches equilibrium with this concentration and adsorbs a large portion of the compound. As the reduced concentration moves down to the next layer, a new equilibrium is established

based on the reduced concentration. This is repeated until the entire compound is removed, or the available GAC is consumed and breakthrough occurs. In the case of TCE, the GAC consumption was calculated first at 10 mg/L, then 1 mg/L, and the remainder at 0.01 mg/L, giving 3.06, 7.01, and 7.79 lb, respectively, for a total of 17.86 lb. 1,1,1-TCA was calculated at 1 and 0.01 mg/L, and the methylene chloride was calculated at 1, 0.10, and 0.01 mg/L. The total GAC consumption for treating the drum filling water is 354.5 lb. With 187.5 lb used previously for the V-Tank water treatment, 132.5 lb GAC remains available in the 1st stage units for drum filling. This operation will consume approximately 1 lb of GAC for every 5 gallons of water treated. Therefore, after 500 to 600 gallons have been processed, the 1st stage units need to be removed and two new units provided for the 2nd stage with the units used previously in the 2nd stage becoming 1st stage units. After completing the drum filling water treatment, a total of 8 GAC units will require disposal.

The two oil and grease filters should last for the entire activity and will require disposal when all treatment is completed. The bag filters are also expected to last for the full treatment cycle and will require disposal when completed.

The ion exchange loading from drum filling water treatment is 21.36 lb as $CaCO_3$, including 1.04 lb from radionuclides. The total loading to the ion exchange system for all water treatment is 43.191 lb as $CaCO_3$ per cubic foot. Strong acid cation resin in the sodium form has an exchange capacity of 2.14 lb as $CaCO_3$. The quantity of resin exhausted then is 20.2 ft^3. The ion exchange unit for each train will contain 24 ft^3 of resin, which will require disposal after the treatment process has been completed.

Figure 4-5 shows a contingency water treatment process similar to those described previously. No mass balance is presented because it is believed that, after the first treatment, the water will meet LDR standards. Should testing indicate otherwise, then this process will be activated with the water being circulated back to the water storage tank(s). This will continue until testing proves that the LDR and WAC standards are met.

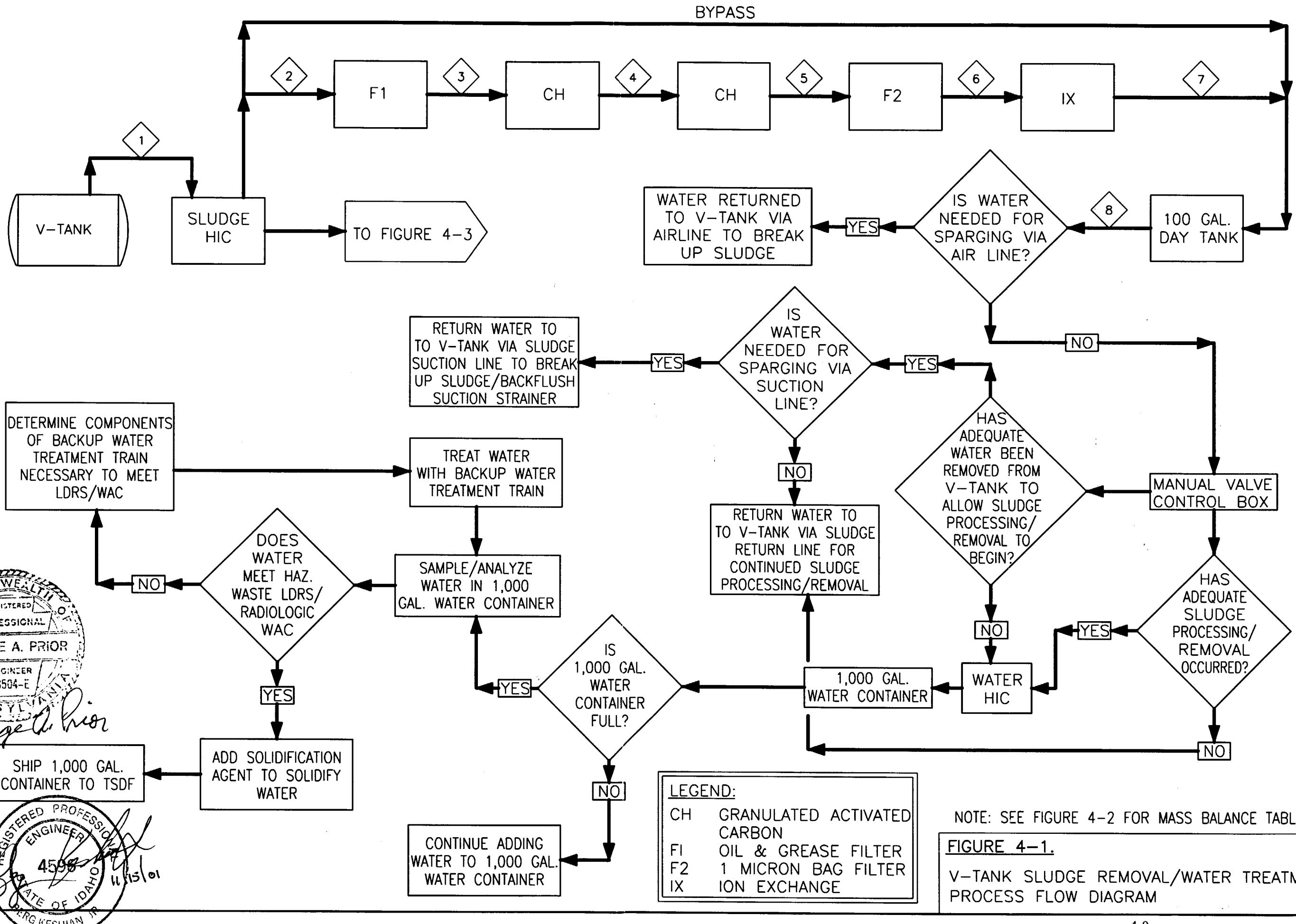
After water within the containers has been treated to meet the TSDF's WAC and LDRs, a solidification agent will be added to the container, as recommended by the manufacturer or the agent. It is expected that approximately 4 lb of agent will be used. The actual amount of agent to be used will be confirmed with a small bench-scale pilot test using a sample of the actual liquid that will be solidified. The amount of agent to be used will be adjusted until the degree of solidification expected is obtained. Mixing of the liquid with mechanical agitation after addition of the solidification agent is not required; however, mixing will accelerate the solidification process and may be used depending on results of the bench scale test.

4.5 Quality Assurance

A safety category evaluation (formerly called a quality level designation), included as Appendix E, has been prepared for all structures, systems, and components of the remediation. The evaluation was performed in accordance with Management Control Procedure (MCP)-540, "Documenting the Safety Category of Structures, Systems, and Components" (Revision 13). A Bechtel BWXT Idaho, LLC Quality Level 3-facility designation has been deemed appropriate for this project. A Quality Level 3 is equivalent to a Low Safety Consequence (LSC) classification. The majority of project components have been evaluated as LSC. The Price-Anderson Amendment Act requirements apply to this remediation.

The Group 2 RD/RA WP will comply with the quality assurance/quality control criteria and requirements stated in the quality assurance project plan entitled *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites* (DOE-ID-2000d) for sampling and data management.

A Subcontractor Quality Plan for the remediation effort has been prepared in accordance with program requirements document (PRD)-5006, "Subcontractor Quality Plan" (WESTON 2001c). The Subcontractor Quality Plan addresses how design inputs, analyses, verifications, outputs, and changes are controlled and followed.



NOTE: SEE FIGURE 4-2 FOR MASS BALANCE TABLES

FIGURE 4-1.

V-TANK SLUDGE REMOVAL/WATER TREATMENT PROCESS FLOW DIAGRAM

FILE NO. G:\ACADPROJ\12393002001INEEL\FIGURE1A.dwg

TANK V-1 MASS BALANCE

STREAM NO.		1	2	3	4	5	6	7	8	LDR WASTEWATER TREATMENT STANDARD
STREAM DESCRIPTION		SLUDGE HIC INFLUENT	F1	CH FEED	CH FEED	F2 FEED	IX FEED	DAY TANK	EFFLUENT	
FLOW RATE	GPM	10	10	10	10	10	10	10	10	–
VOLUME	GAL	1684	644	644	644	644	644	644	644	–
LEAD	mg/L	0.84	0.84	0.84	0.84	0.84	0.84	0.04	0.04	0.69
MERCURY	mg/L	0.369	0.369	0.369	0.369	0.369	0.369	0.018	0.018	0.15
TETRACHLOROETHENE	mg/L	0.14	0.14	0.14	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.056
TRICHLOROETHENE	mg/L	0.16	0.16	0.16	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.054
TOC	mg/L	66	66	66	3	< 0.3	< 0.3	< 0.3	< 0.3	VARIES
Sr-90	pCi/L	7.708 E + 06	2.03 E + 06	2.03 E + 06	2.03 E + 06	2.03 E + 06	2.03 E + 06	2.03 E + 05	2.03 E + 05	–
Cs-137	pCi/L	8.806 E + 06	2.90 E + 06	2.90 E + 06	2.90 E + 06	2.90 E + 06	2.90 E + 06	2.90 E + 05	2.90 E + 05	–
OIL & GREASE	mg/L	4.17	4.17	1.00	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	–
TOTAL SUSPENDED SOLIDS	mg/L	–	8	1	< 1	< 1	< 1	< 1	< 1	–
SPECIFIC GRAVITY		1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	–

TANK V-2 MASS BALANCE

STREAM NO.		1	2	3	4	5	6	7	8	LDR WASTEWATER TREATMENT STANDARD
STREAM DESCRIPTION		SLUDGE HIC INFLUENT	F1	CH FEED	CH FEED	F2 FEED	IX FEED	DAY TANK	EFFLUENT	
FLOW RATE	GPM	10	10	10	10	10	10	10	10	–
VOLUME	GAL	1596	556	556	556	556	556	556	556	–
TRICHLOROETHENE	mg/L	0.30	0.30	0.30	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.054
TOC	mg/L	105	105	105	5	< 0.5	< 0.5	< 0.5	< 0.5	VARIES
Sr-90	pCi/L	1.096 E + 07	4.90 E + 06	4.90 E + 06	4.90 E + 06	4.90 E + 06	4.90 E + 06	4.90 E + 05	4.90 E + 05	–
Cs-137	pCi/L	6.192 E + 06	1.35 E + 07	1.35 E + 07	1.35 E + 07	1.35 E + 07	1.35 E + 07	1.35 E + 06	1.35 E + 06	–
OIL & GREASE	mg/L	< 1	< 1	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	–
TOTAL SUSPENDED SOLIDS	mg/L	–	26.7	1	< 1	< 1	< 1	< 1	< 1	–
SPECIFIC GRAVITY		1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

TANK V-3 MASS BALANCE

STREAM NO.		1	2	3	4	5	6	7	8	LDR WASTEWATER TREATMENT STANDARD
STREAM DESCRIPTION		SLUDGE HIC INFLUENT	F1	CH FEED	CH FEED	F2 FEED	IX FEED	DAY TANK	EFFLUENT	
FLOW RATE	GPM	10	10	10	10	10	10	10	10	–
VOLUME	GAL	8301	6995	6995	6995	6995	6995	6995	6995	–
TRICHLOROETHENE	mg/L	0.20	0.20	0.20	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.054
TOC	mg/L	105	105	105	5	< 0.5	< 0.5	< 0.5	< 0.5	VARIES
Sr-90	pCi/L	2.162 E + 07	1.23 E + 07	1.23 E + 07	1.23 E + 07	1.23 E + 07	1.23 E + 07	1.23 E + 06	1.23 E + 06	–
Cs-137	pCi/L	7.598 E + 06	4.23 E + 06	4.23 E + 06	4.23 E + 06	4.23 E + 06	4.23 E + 06	4.23 E + 05	4.23 E + 05	–
OIL & GREASE	mg/L	4.29	4.29	1.00	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	–
TOTAL SUSPENDED SOLIDS	mg/L	–	65.3	5	< 1	< 1	< 1	< 1	< 1	–
SPECIFIC GRAVITY		1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00	–

TANK V-9 CONCENTRATIONS

STREAM NO.		1
STREAM DESCRIPTION		SLUDGE HIC INFLUENT
FLOW RATE	GPM	40
VOLUME	GAL	320
CADMIUM	mg/L	1.9
MERCURY	mg/L	0.563
LEAD	mg/L	0.942
NICKEL	mg/L	13.8
METHYLENE CHLORIDE	mg/L	59.0
1, 1, 1-TRICHLORETHANE	mg/L	58.0
TRICHLOROETHENE	mg/L	410.0
3, 3-DICHLOROBENZIDINE	mg/L	0.066
2, 4-DIMETHYLPHENOL	mg/L	0.079
INDENO (1,2,3-CD) PYRENE	mg/L	0.036
2-METHYLPHENOL	mg/L	0.83
4-METHYLPHENOL	mg/L	0.83
PHENOL	mg/L	0.1
TOC	mg/L	3
Sr-90	pCi/L	6.405 E + 06
Cs-137	pCi/L	5.590 E + 06
OIL & GREASE	mg/L	–
TOTAL SUSPENDED SOLIDS	mg/L	–
SPECIFIC GRAVITY		1.02

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REGISTERED PROFESSIONAL ENGINEER 4896 STATE OF IDAHO BERGKESHIAN JR 12/15/01

George A. Prior

LEGEND:

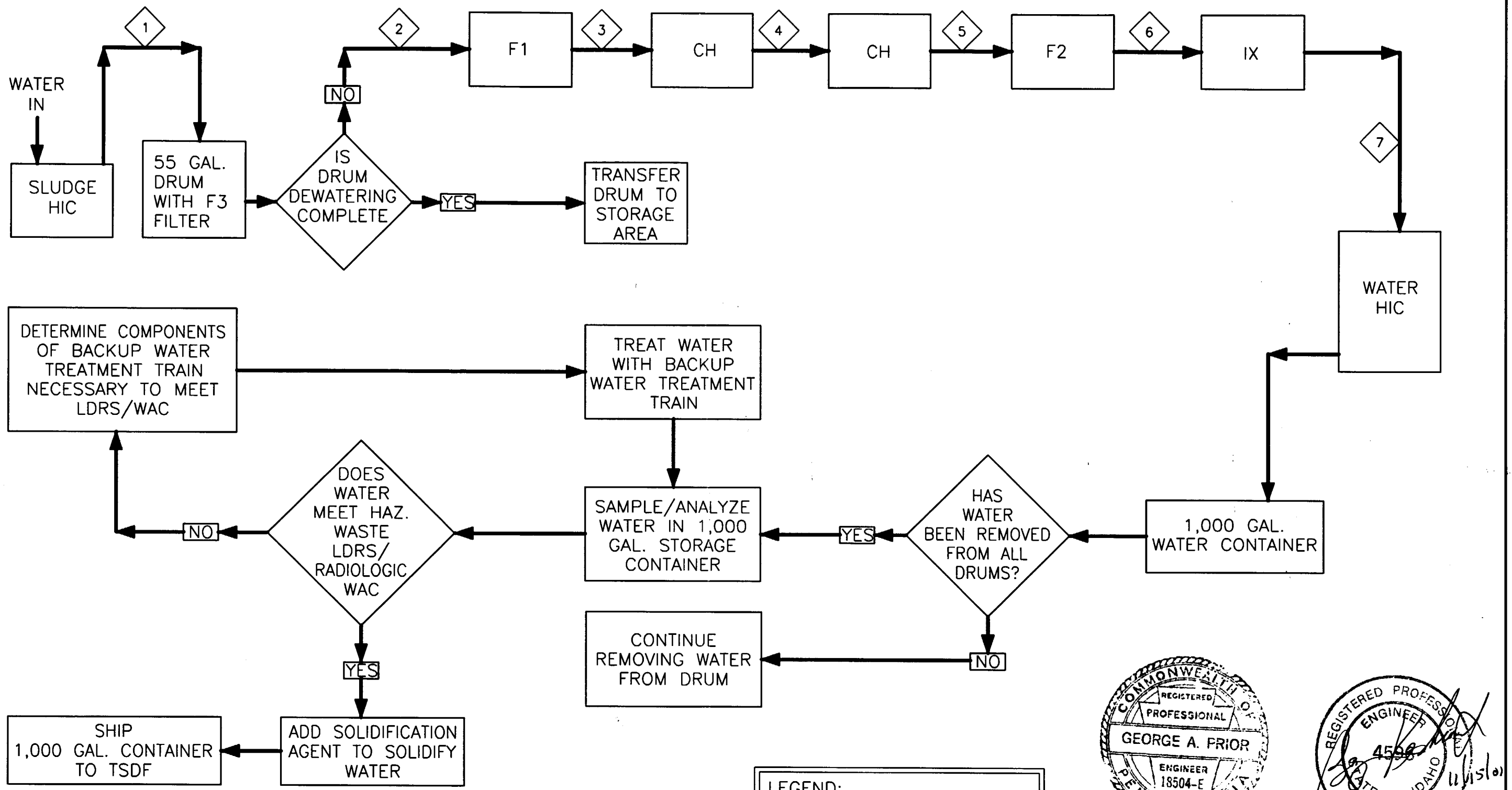
CH	GRANULATED ACTIVATED CARBON
F1	OIL & GREASE FILTER
F2	1 MICRON BAG FILTER
IX	ION EXCHANGE

NOTE: SEE FIGURE 4-1 FOR PROCESS FLOW DIAGRAM

FIGURE 4-2.

V-TANK SLUDGE REMOVAL/WATER TREATMENT PROCESS FLOW MASS BALANCE TABLES

FILE NO. G:\ACADPROJ\12393002001INEEL\FIGURE2A.dwg



LEGEND:

CH	GRANULATED ACTIVATED CARBON
FI	OIL & GREASE FILTER
F2	1 MICRON BAG FILTER
F3	BARTLETT FILTER, 20x2 POLYPROPYLENE ELEMENT
IX	ION EXCHANGE

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REGISTERED PROFESSIONAL
GEORGE A. PRIOR
ENGINEER
18504-E

George A. Prior

REGISTERED PROFESSIONAL ENGINEER
4596
STATE OF IDAHO
BERG KESHIAN JR
11/15/01

NOTE: SEE FIGURE 4-4 FOR MASS BALANCE TABLE

FIGURE 4-3.

V-TANK DRUM FILLING AND DEWATERING PROCESS FLOW DIAGRAM

FILE NO. G:\ACADPROJ\12393002001INEEL\FIGURE3A.dwg

DRUM DEWATERING COMPOSITE MASS BALANCE

STREAM NO.		1	2	3	4	5	6	7	LDR WASTEWATER TREATMENT STANDARD
STREAM DESCRIPTION		F3	F1	CH	CH	F2	IX FEED	WATER HIC FEED	
FLOW RATE	GPM	10	10	10	10	10	10	10	–
VOLUME,	GAL	3706	1763	1763	1763	1763	1763	1763	–
LEAD	mg/L	0.317	0.317	0.317	0.317	0.317	0.317	0.016	0.69
MERCURY	mg/L	0.152	0.152	0.152	0.152	0.152	0.152	0.008	0.15
NICKEL	mg/L	1.194	1.194	1.194	1.194	1.194	1.194	0.060	3.98
CADMIUM	mg/L	0.132	0.132	0.132	0.132	0.132	0.132	0.007	0.69
TETRACHLOROETHENE,	mg/L	0.039	0.039	0.039	< 0.01	< 0.01	< 0.01	< 0.01	0.056
TRICHLOROETHENE	mg/L	35.602	35.602	35.602	1.80	< 0.05	< 0.05	< 0.05	0.054
METHYLENE CHLORIDE	mg/L	5.008	5.008	5.008	0.25	< 0.01	< 0.01	< 0.01	0.089
1, 1, 1–TRICHLORETHANE	mg/L	5.095	5.095	5.095	0.25	< 0.01	< 0.01	< 0.01	0.054
3, 3–DICHLOROBENZIDENE,	mg/L	0.0057	0.0057	0.0057	< 0.01	< 0.01	< 0.01	< 0.01	0.055
2, 4–DIMETHYLPHENOL,	mg/L	0.0068	0.0068	0.0068	< 0.01	< 0.01	< 0.01	< 0.01	0.036
INDENO	mg/L	0.0031	0.0031	0.0031	< 0.01	< 0.01	< 0.01	< 0.01	0.0055
2–METHYLPHENOL,	mg/L	0.0717	0.0717	0.0717	< 0.01	< 0.01	< 0.01	< 0.01	0.11
4–METHYLPHENOL,	mg/L	0.0717	0.0717	0.0717	< 0.01	< 0.01	< 0.01	< 0.01	0.77
PHENOL,	mg/L	0.0087	0.0087	0.0087	< 0.01	< 0.01	< 0.01	< 0.01	0.039
TOC	mg/L	85	85	85	4	< 0.5	< 0.5	< 0.5	VARIES
Sr-90	pCi/L	1.341 E + 07	6.70 E + 06	6.70 E + 06	6.70 E + 06	6.70 E + 06	6.70 E + 06	6.70 E + 05	–
Cs-137	pCi/L	7.369 E + 06	6.13 E + 06	6.13 E + 06	6.13 E + 06	6.13 E + 06	6.13 E + 06	6.13 E + 05	–
OIL & GREASE	mg/L	2.96	2.96	1.00	< 0.1	< 0.1	< 0.1	< 0.1	–
TOTAL SUSPENDED SOLIDS	mg/L	–	32.1	1	< 1	< 1	< 1	< 1	–
SPECIFIC GRAVITY		1.02	1.00	1.00	1.00	1.00	1.00	1.00	–

LEGEND:

- CH GRANULATED ACTIVATED CARBON
- FI OIL & GREASE FILTER
- F2 1 MICRON BAG FILTER
- F3 BARTLETT FILTER, 20x2 POLYPROPYLENE ELEMENT
- IX ION EXCHANGE

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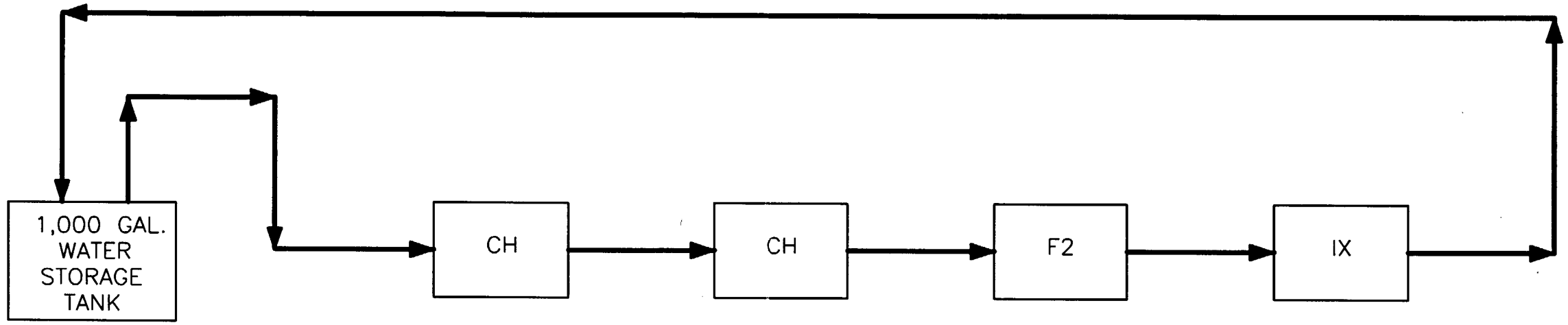
REGISTERED PROFESSIONAL ENGINEER 4598 STATE OF IDAHO BERG KESHIAN JR 11/15/01

NOTE: SEE FIGURE 4-3 FOR PROCESS FLOW DIAGRAM

FIGURE 4–4.

V–TANK DRUM FILLING AND DEWATERING PROCESS FLOW COMPOSITE MASS BALANCE TABLE

FILE NO. G:\ACADPROJ\1239300200 1INEEL\FIGURE4A.dwg



LEGEND:

CH	GRANULATED ACTIVATED CARBON
F2	1 MICRON BAG FILTER
IX	ION EXCHANGE

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4896
STATE OF IDAHO
BERG KESHIAN JR
11/15/01

George A. Prior

FIGURE 4–5.

V–TANK BACKUP WATER TREATMENT PROCESS FLOW DIAGRAM

FILE NO. G:\ACADPROJ\12393002001INEEL\FIGURE5A.dwg

5. ENVIRONMENTAL COMPLIANCE

5.1 Applicable or Relevant and Appropriate Requirements

The OU 1-10 ROD (DOE-ID 1999) presents the applicable or relevant and appropriate requirements (ARARs) specific to the V-Tanks remedial action. Table 5-1 summarizes the ROD-identified ARARs, relevancy, and how each requirement has been addressed in the remedial design or will be met during the remedial action. Additional identified applicable environmental regulations under consideration for the ESD are presented in Table 5-2.

Table 5-1. ARARs for the V-Tanks (TSF-09 and TSF-18) selected remedy.

Category	Citation	Relevancy[a]	Compliance Strategy
Action-Specific ARARs			
Rules for the Control of Air Pollution in Idaho			
"Toxic Substances" IDAPA 16.01.01.161 "Toxic Air Emissions" IDAPA 16.01.01.585 and .586	The release of carcinogenic and noncarcinogenic contaminants into the air must be estimated before start of construction, controlled, if necessary, and monitored during excavation of soil, removal of the waste and tank system, and decontamination of the tanks and piping.	A	Releases of carcinogenic and noncarcinogenic contaminants into the air from the site are addressed in Appendix D in which modeling indicates under worst case scenarios that chemical and radionuclide concentrations will not come close to approaching IDAPA air quality limits, NESHAP limits for radionuclides, or OSHA permissible exposure limits. Air emissions will be monitored during excavation and dust suppression measures will be used, as indicated in Appendix B, Design Specifications 02200.
"Fugitive Dust" IDAPA 16.01.01.650 and .651	Requires control of dust during excavation and removal of the tanks and piping.	A	Dust suppression measures will be implemented, as necessary, during the remedial action to minimize the generation of fugitive dust, as indicated in Appendix B, Design Specifications. These measures may include water/surfactant sprays, keeping vehicle speeds to a minimum, and work controls during periods of high wind.
"Requirements for Portable Equipment" IDAPA 16.01.01.500.02	Portable equipment for removal of the waste, tanks, and piping, and any portable support equipment must be operated to meet state and federal air emissions rules.	A	When used, portable equipment will comply with the requirements of MCP-3480 Section 4.2.8 or equivalent evaluation.
National Emission Standards for Hazardous Air Pollutants (NESHAP)			
"Radionuclide Emissions from DOE Facilities" 40 CFR 61.92 "Emission Monitoring" 40 CFR 61.93 "Emission Compliance" 40 CFR 61.94(a)	Limits exposure of radioactive contamination release to 10 mrem/yr for the off-Site receptor and establishes monitoring and compliance requirements.	A	Radionuclide emission calculations and air modeling are presented in Appendix D. The model resulted in an estimate of approximately 5 E-7 mrem/yr dose at the INEEL fence line located 12 km (7.5 mi) northeast of TAN. The calculated emissions will be included in the INEEL's annual NESHAP report, which determines the effective dose equivalent from the INEEL to members of the public.

Table 5-1. (continued).

Category	Citation	Relevancy[a]	Compliance Strategy
Resource Conservation and Recovery Act (RCRA) – Standards Applicable to Generators of Hazardous Waste			
"Hazardous Waste Determination" IDAPA 16.01.05.006 (40 CFR 262.11)	A hazardous waste determination (HWD) is required for the waste, tanks, piping, and any secondary waste generated during remediation.	A	A HWD will be based on an evaluation of sampling data and process knowledge to determine characterization of the waste. A preliminary determination is provided in Appendix C.
"Manifest" IDAPA 16.01.05.006 (40 CFR 262, Subpart B)	Establishes requirements for transporting hazardous waste to the treatment and/or disposal site.	A	Prior to transporting hazardous waste offsite, Uniform Hazardous Waste Manifests will be prepared.
"Pre-Transportation Requirements" IDAPA 16.01.05.006 (40 CFR 262.30–262.33)			The waste will be packaged, labeled, marked, and placarded for offsite transportation.
RCRA – Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Units			
"General Waste Analysis" IDAPA 16.01.05.008 (40 CFR 264.13[a][1–3])	Analysis requirements apply to the soils, waste, tanks, piping, and secondary waste generated during remediation.	A	Samples will be obtained to determine whether the generated waste material meets the acceptance criteria for the designated disposal facility (or facilities).
"Security of Site" IDAPA 16.01.05.008 (40 CFR 264.14)	Measures must be taken to restrict access to the site during excavation; removal of the waste, tanks, and piping; and decontamination of the tank and piping.	A	INEEL security measures, such as access restrictions, will be implemented during remediation activities. A 6-ft security fence will be used around the entire perimeter of the site. Warning signs will be posted. Temporary barriers will be erected around the excavation for further access restriction.
"General Inspections" IDAPA 16.01.05.008 (40 CFR 264.15)	Regular inspections must be performed during remediation.	A	Routine inspections will be conducted during and following remediation. During remediation activities, inspections will be conducted to fulfill requirements of 40 CFR 264 Subparts I and J. After remediation, waste in long-term onsite storage will be inspected to meet the requirements of 40 CFR Subparts I and J.
"Personnel Training" IDAPA 16.01.05.008 (40 CFR 264.16)	All personnel involved in soil excavation; removal of the waste, tanks, and piping; and decontamination of the tank and piping must be trained.	A	The substantive training requirements for training are listed in the HASP. Personnel will be trained in hazardous waste management requirements.

Table 5-1. (continued).

Category	Citation	Relevancy[a]	Compliance Strategy
"Preparedness and Prevention" IDAPA 16.01.05.008 (40 CFR 264, Subpart C)	Applies to soil excavation, waste and tank system removal, and decontamination activities.	A	Emergency equipment (fire extinguishers, communications systems, etc.) will be identified, tested, and maintained as described in the site HASP. The arrangements with local authorities will also be detailed.
"Contingency Plan and Emergency Procedures" IDAPA 16.01.05.008 (40 CFR 264, Subpart D)	Applies to soil excavation, waste and tank system removal, and decontamination activities.	A	The substantive requirements of a contingency plan will be maintained in the site HASP. The HASP establishes an emergency response plan that documents the coordinated course of action to be followed in case of a fire, explosion, or release of hazardous waste or hazardous waste constituents, which could threaten human health or the environment.
"Equipment Decontamination" IDAPA 16.01.05.008 (40 CFR 264.114)	All equipment used during remediation must be decontaminated if hazardous waste is contacted.	A	Equipment decontamination will be conducted in accordance with the project Decontamination Plan.
"Use and Management of Containers" IDAPA 16.01.05.008 (40 CFR 264.171–178)	Applicable to the soils, waste, tanks, piping, and any secondary hazardous waste-generated remediation that is managed in containers.	A	All onsite containers will be selected to ensure waste is compatible with the container and container integrity is maintained. Weekly inspections will be conducted. Secondary containment for all containers with free liquids will be used.
"Tank Closure and Post-Closure Care" IDAPA 16.01.05.008 (40 CFR 264.197[a])	Applies to the soils, waste, tanks, and piping.	A	All waste and system components will be removed. Confirmation sampling will be performed as detailed in the Remedial Action Confirmation Field Sampling Plan. At closure of each tank system, a detailed review of all analytical data associated with the waste will be performed to ensure all tanks and system components are managed accordingly.
RCRA – Land Disposal Restrictions			
"Land Disposal Restriction (LDR) Treatment Standards" IDAPA 16.01.05.011 (40 CFR 268.40 [a][b][e])	The waste, tank, and piping must be treated, if necessary, to meet LDR criteria before disposal.	A	A preliminary HWD has been made, and applicable treatment standards associated with each constituent have been identified (Appendix C). All waste generated and associated data will be compared to these values to ensure strict compliance to LDRs, prior to treatment and eventual disposal of this waste.
"Treatment Standards for Hazardous Debris" IDAPA 16.01.05.011 (40 CFR 268.45[a][b][c][d])		A	These alternative treatment standards will be considered for all debris items generated. Specifically, a majority of items associated with equipment and piping removal will be shipped offsite for treatment as debris.

Table 5-1. (continued).

Category	Citation	Relevancy[a]	Compliance Strategy
"Universal Treatment Standards" IDAPA 16.01.05.011 (40 CFR 268.48[a])		A	A preliminary HWD has been made based on existing analytical data (Appendix C), which includes the identification of all reasonably expected to be present underlying hazardous constituents and associated universal treatment standards.
"Alternative Treatment Standards for Contaminated Soil" IDAPA 16.01.05.011 (40 CFR 268.49)	Applies to any contaminated soil that is to be removed from the V-Tank and disposed at an approved facility on the INEEL or off the INEEL.	A	Current compliance strategy, which these alternative treatments are being considered for, is onsite treatment/disposal of soils. However, it is not expected that states in which current offsite disposal facilities are being considered have adopted these alternative standards. Therefore, current strategy is to move forward assuming compliance with the requirements of 40 CFR 268.40 and 268.45.
"CERCLA Off-Site Policy" 40 CFR 300.440		A	Prior to offsite disposal, EPA Region 10 will be consulted to ensure that any offsite vendor(s) selected for treatment and/or disposal will meet this requirement. The CERCLA offsite policy is not required for ICDF treatment and/or disposal.
Toxic Substance Control Act – PCBs			
"PCB Remediation Waste: Performance-based Disposal" 40 CFR 761.61 (b)(1)	The tank waste must be treated or decontaminated to meet PCB disposal criteria. Applies only to the tank waste.	A	Current strategy is to separate out the multiphasic waste from the tanks and to merge the solid phase in accordance with 40 CFR 761.60(e). It is expected that the liquid phase of these tank wastes may be managed as ≤50-ppm waste.
"Decontamination Standards and Procedures: Self-implementing Decontamination Procedures" 40 CFR 761.79(c)(1) and (2)	Applies to decontamination of the tank, piping, and equipment that comes into contact with the tank waste.	A	For debris consisting of tanks, piping, and equipment, the current strategy will be to meet the TSDF's (e.g., Envirocare) waste acceptance criteria. Decontamination will be conducted according to applicable regulations and reduced to levels acceptable to the TSDF's WAC.
"Decontamination solvents" 40 CFR 761.79(d)	Applies to solvents used for decontamination.	A	For solvents used for decontamination, the current strategy will be to meet the TSDF's (e.g., Envirocare) waste acceptance criteria, which is that the liquids must be solidified prior to shipment.
"Limitation of exposure and control of releases" 40 CFR 761.79(e)	Applies to all persons who will be conducting decontamination activities of the tank and piping.	A	For personnel performing decontamination activities, the workers will comply with the Health and Safety Plan for this project.
"Decontamination Waste and Residues" 40 CFR 761.79(g)	Applies to the decontamination of waste and residuals.	A	For decontamination waste and residues, the current strategy will be to meet the TSDF's (e.g., Envirocare) waste acceptance criteria. All liquids will be solidified prior to shipment.

Table 5-1. (continued).

Category	Citation	Relevancy[a]	Compliance Strategy
To-be-considered (TBC) guidance			
Radiation Protection of the Public and the Environment			
DOE Order 5400.5, Chapter II (1)(a,b)	Order that limits the effective dose to the public from exposure to radiation sources and airborne releases.	–	Will be met by administrative and engineering controls as well as personnel real-time monitoring during excavation of contaminated soils, tank contents removal, and tank and ancillary piping removal. Excavated areas will be backfilled after closure. Job Safety Analyses and Radiological Work Permits will be prepared for tasks where there is the potential for exposures to radioactive contamination/materials. Radiological work permits will only be used as determined by the radiological control technician, based on the INEEL *Radiological Control Manual* (PRD-183).
Institutional Controls			
Region 10 Final Policy on the Use of Institutional Controls at Federal Facilities	Applies to contamination left in place or remaining above 1E-04 risk.	–	The institutional control requirements specified in the *Institutional Control Plan for the Test Area North Waste Area Group 1* (DOE-ID 2000e). This plan documents current and future activities for implementing institutional controls in accordance with the Operable Unit 1-10 Record of Decision and was designed to meet the Region 10 final policy.

a. A = applicable and RA = relevant and appropriate

– = TBCs are not classified as applicable or relevant and appropriate.

CFR = Code of Federal Regulations

NESHAP = National Emission Standards for Hazardous Air Pollutants

IDAPA = Idaho Administrative Procedures Act (Note: The original ROD ARARs [16.00 series] will continue to be cited and will remain in effect, as 16.01, but the numbering system has been changed to 58.01 [58.00 series]).

Table 5-2. Newly Identified Regulatory Requirements for the OU 1-10 V-Tank Remediation, under consideration in the ESD.

Requirement	Action/ Chemical/ Location	Applicable or Relevant/Appropriate	Brief Description of Requirement	How Applicable	Compliance Strategy
40 CFR 264.192(a)(1)(2)(3) and (b)	Action	Applicable	A registered professional engineer must certify new tank systems.	This is applicable to equipment used to pump tank contents into containers and to equipment used to treat liquid waste through carbon and ion exchange (IX) columns. This requirement is relevant and appropriate to transferring liquid waste back to the tanks, dewatering sludge, and transferring sludge from high-integrity containers (HICs) to drums. This is relevant and appropriate to the decontamination pad and related sump as a Temporary Unit.	All design drawings and specifications will be stamped by an Idaho Registered Professional Engineer.
40 CFR 264.192(d)	Action	Applicable	New tank systems must be leak tested prior to use.	This is applicable to equipment used to pump tank contents into containers and to equipment used to treat liquid waste through carbon and IX columns. This requirement is relevant and appropriate to transferring liquid waste back to the tanks, dewatering sludge, and transferring sludge from HICs to drums. This is relevant and appropriate to the decontamination pad and related sump as a Temporary Unit.	All systems will have a mockup simulation and pre-startup test for testing and functional operations.
40 CFR 264.193(a)(1), (b), (c), (d), (e)(1), and (f)	Action	Applicable	Tank systems must have secondary containment.	This is applicable to equipment used to pump tank contents into containers and to equipment used to treat liquid waste through carbon and IX columns. This requirement is relevant and appropriate to transferring liquid waste back to the tanks, dewatering sludge, and transferring sludge from HICs to drums.	All tank systems will have secondary containment. (Appendix A, Drawings 4, 5, and 20 of 20; Appendix C, ABQ12-CE008)

Table 5-2. (continued).

Requirement	Action/ Chemical/ Location	Applicable or Relevant/Appropriate	Brief Description of Requirement	How Applicable	Compliance Strategy
				The sump serves as the secondary containment for the decontamination pad. The sump must be constructed of a material and in such a way that it would retain its shape if lifted from the ground. Hazardous waste will be removed from the sump at the end of each operating day.	
40 CFR 264.194(a)	Action	Applicable	Waste must be compatible with tank materials.	This is applicable to equipment used to pump tank contents into containers and to equipment used to treat liquid waste through carbon and IX columns.	All wastes will be compatible with materials that they are placed in contact with.
				This requirement is relevant and appropriate to transferring liquid waste back to the tanks, dewatering sludge, and transferring sludge from HICs to drums.	
40 CFR 264.194(b) and (c)	Action	Applicable	Tank systems must be designed to prevent spills. If spills do occur, follow CFR 264.196.	This is applicable to equipment used to pump tank contents into containers and to equipment used to treat liquid waste through carbon and IX columns.	All tank systems will have secondary containment and spill prevention measures implemented. This includes tanks for stormwater and decon water.
				This requirement is relevant and appropriate to transferring liquid waste back to the tanks, dewatering sludge, and transferring sludge from HICs to drums.	
				This is relevant and appropriate to the decontamination pad and related sump as a Temporary Unit.	
40 CFR 264.195	Action	Applicable	Tank systems and ancillary equipment must be inspected each operating day.	This is applicable to equipment used to pump tank contents into containers and to equipment used to treat liquid waste through carbon and IX columns.	All tank systems will be inspected each operating day and noted on a daily log.
				This requirement is relevant and appropriate to transferring liquid waste back to the tanks, dewatering sludge, and	

Table 5-2. (continued).

Requirement	Action/ Chemical/ Location	Applicable or Relevant/Appropriate	Brief Description of Requirement	How Applicable	Compliance Strategy
				transferring sludge from HICs to drums. This is relevant and appropriate to the decontamination pad and related sump as a Temporary Unit. The pad and sump will be inspected daily for tears, rips, and signs of leakage. Waste will be removed from the sump at the end of each operating day. If the decontamination pad/sump has not been used, then an inspection is not required that day.	
40 CFR 264.196	Action	Applicable	Leaks from tank systems and ancillary equipment.	This is applicable to equipment used to pump tank contents into containers and to equipment used to treat liquid waste through carbon and IX columns. This requirement is relevant and appropriate to transferring liquid waste back to the tanks, dewatering sludge, and transferring sludge from HICs to drums. This is relevant and appropriate to the decontamination pad and related sump as a Temporary Unit.	All equipment will be leak tested prior to use. All systems will have secondary containment should leaks occur.
40 CFR 264.553	Action	Relevant and Appropriate	Tank and container storage areas used during remedial actions.	Identifies the decontamination pad and related sump as a temporary unit and allows application of tank requirements.	Tank requirements will be applied to temporary tank and decon pad.
40 CFR 761.40	Action	Applicable	Establishes marking requirements for containers and storage locations of PCB waste.	Applicable to short- and long-term storage of PCB wastes at the INEEL from V-Tank remediation.	All storage areas will be labeled and marked accordingly.

Table 5-2. (continued).

Requirement	Action/ Chemical/ Location	Applicable or Relevant/Appropriate	Brief Description of Requirement	How Applicable	Compliance Strategy
40 CFR 761.65(a)(1)	Action	Applicable	Allows storage of radioactive PCBs >1 year provided a written record documenting attempts to identify disposal options is maintained.	This applies to PCB waste generated during V-Tank remediation.	A written record will be kept of all attempts to dispose of PCB-contaminated waste.
40 CFR 761.65(b)(1)(i)–(v)	Action	Applicable	Establishes storage requirements for PCB waste.	Applies to temporary storage of PCB waste near the V-Tanks and prior to shipment for long-term storage.	Temporary storage area will be constructed with appropriate berm and liner.
40 CFR 761.65(b)(1)	Action	Applicable	Establishes storage requirements for PCB waste.	Applicable to long-term storage of PCB wastes at the INEEL from V-Tank remediation.	The long-term storage area will be appropriately constructed to meet the requirement.
40 CFR 761.65(c)	Action	Applicable	Requires inspections of PCB waste every 30 days and allows storage of radioactive PCBs in containers not approved by the DOT.	Applicable to short- and long-term storage of PCB wastes at the INEEL from V-Tank remediation.	All PCB-contaminated waste will be inspected every 30 days, and a log will be maintained to verify inspection, in accordance with INEEL *Manual 17—Waste Management*.
40 CFR 761.65(c)(i)(4)	Action	Applicable	Allows 30-day storage of PCB waste.	Applicable to short-term storage of PCB wastes before entering interim storage (long-term storage).	A spill prevention controls and countermeasures plan will be written to address short-term PCB storage.

6. REMEDIAL ACTION WORK PLAN

This section details the approach to implementing the remedial design. It includes the steps and schedule for conducting the remedial action. The following subsections detail the technical requirements for the remedial action.

6.1 Project Controls

Project controls include field oversight/construction management, protocol and coordination of field oversight, project cost estimate, and the project schedule.

6.1.1 Field Oversight/Construction Management

The DOE-ID remediation project manager will be responsible for notifying the EPA and IDEQ of project activities. The project manager will also serve as the single interface point for all routine contact between the Agencies, the INEEL Management and Operations (M&O) contractor, and the subcontractor.

The INEEL M&O contractor will provide field oversight and construction management services for this project. The INEEL M&O contractor will also provide field support services for health and safety, radiological control, environmental compliance, quality assurance, and landlord services. An organization chart and position description are provided in the project HASP (INEEL 2001c).

6.1.2 Protocol and Coordination of Field Oversight

The DOE will notify the EPA and IDEQ WAG managers of pending remedial action activities, such as project startup, closeout, and inspections. Activities related to preliminary inspections, the prefinal inspection, and the final inspection are included in Section 6.5. In accordance with the FFA/CO, a minimum notification of 14 calendar days will be provided prior to prefinal inspection activities.

Visitors to the site who wish to observe activities must meet badging and training requirements necessary to enter INEEL facilities. Training requirements for visitors are described in Section 4 of the project HASP (INEEL 2001c).

6.1.3 Project Cost Estimate

The cost estimates for the V-Tanks remedial action addressed by this work plan are presented in Appendix F, Remedial Action Cost Estimate.

6.1.4 Project Schedule

The V-Tanks remedial action working schedule summary with associated enforceable milestones is presented in Table 6-1. The project working schedule including all project tasks, starting with V-9 sampling and the Group 2 RD/RA WP preparation through completion of the final inspection, is presented in Figure 6-1. The schedule does not include any contingency for delay due to late or slow document reviews or for field activities with productivity lost as a result of adverse weather conditions.

Table 6-1. Working schedule and enforceable dates for the OU 1-10 Group 2 remedial action.

Activity	Planned Start Date	Planned Completion Date	Enforceable Completion Date
Remedial Design(Group 2 RD/RA Work Plan)			
Submittal of draft RD/RA Work Plan to Agencies[a]	7/16/2001	7/16/2001	8/6/2001[a]
Agencies Review of draft RD/RA Work Plan	7/17/2001	8/30/2001	—[b]
Submittal of draft final RD/RA Work Plan to Agencies		10/16/2001	—[b]
Agencies Review of draft final RD/RA Work Plan	10/17/2001	10/31/2001	—[b]
RD/RA Work Plan Becomes Final		11/16/2001	—[b]
Post-ROD Sampling (Tank V-9 Criticality Sampling)			
Tank V-9 Sampling	4/30/2001	5/10/2001	
Tank V-9 Sample Analysis	5/10/2001	6/20/2001	
Transmit Unvalidated Data Results to Agencies	6/21/2001	6/21/2001	
Tank V-9 Data Validation	6/21/2001	7/11/2001	
Perform V-9 Criticality Analysis	6/21/2001	7/20/2001	
Submittal of Tank V-9 Sampling Limitation and Validation Reports to Agencies	7/20/2001	7/20/2001	8/28/2001[c]
V-Tanks Remedial Action			
Agency Prefinal Inspection Prior to Tank Contents Removal	6/20/2002	6/21/2002	
Complete Tanks V-1, V-2, and V-3 Contents Removal		9/19/2002	
Complete Tank Contents Waste Transportation, Treatment, and Disposal		9/30/2004	
Complete Tank V-9 Contents Removal		10/14/2002	
Complete Tanks and Ancillary Piping/Equipment Removal		6/18/2003	
Agency Prefinal Inspection after Tanks and Ancillary Piping/Equipment Removal	7/15/2003	7/16/2003	
Complete Final Soil Excavation and Backfill to Complete Remedial Action		8/13/2004	
Agency Final Inspection	8/16/2004	8/17/2004	
Submit Group 2 Final Inspection Report		9/28/2004	
Agency Review of Group 2 Final Inspection Report	TBD	TBD	
Group 2 Final Inspection Report Finalized		TBD	
Five-Year Review	—[d]	—[d]	

a. The enforceable date is from the OU 1-10 Remedial Design/Remedial Action Scope of Work (DOE-ID 2000a).

b. Review periods are consistent with Section 8.13 of the FFA/CO (DOE-ID 1991).

c. Limitation and validation reports will be submitted with the FFA/CO (DOE-ID 1991) required 120 days from start of sampling; date is based upon 4/30/2001 start of sampling. This is a required submittal data to the Agencies, but is not an FFA/CO "enforceable" date.

d. The first five-year review is planned for 2005. Specific dates will be determined by the Agencies in the future.

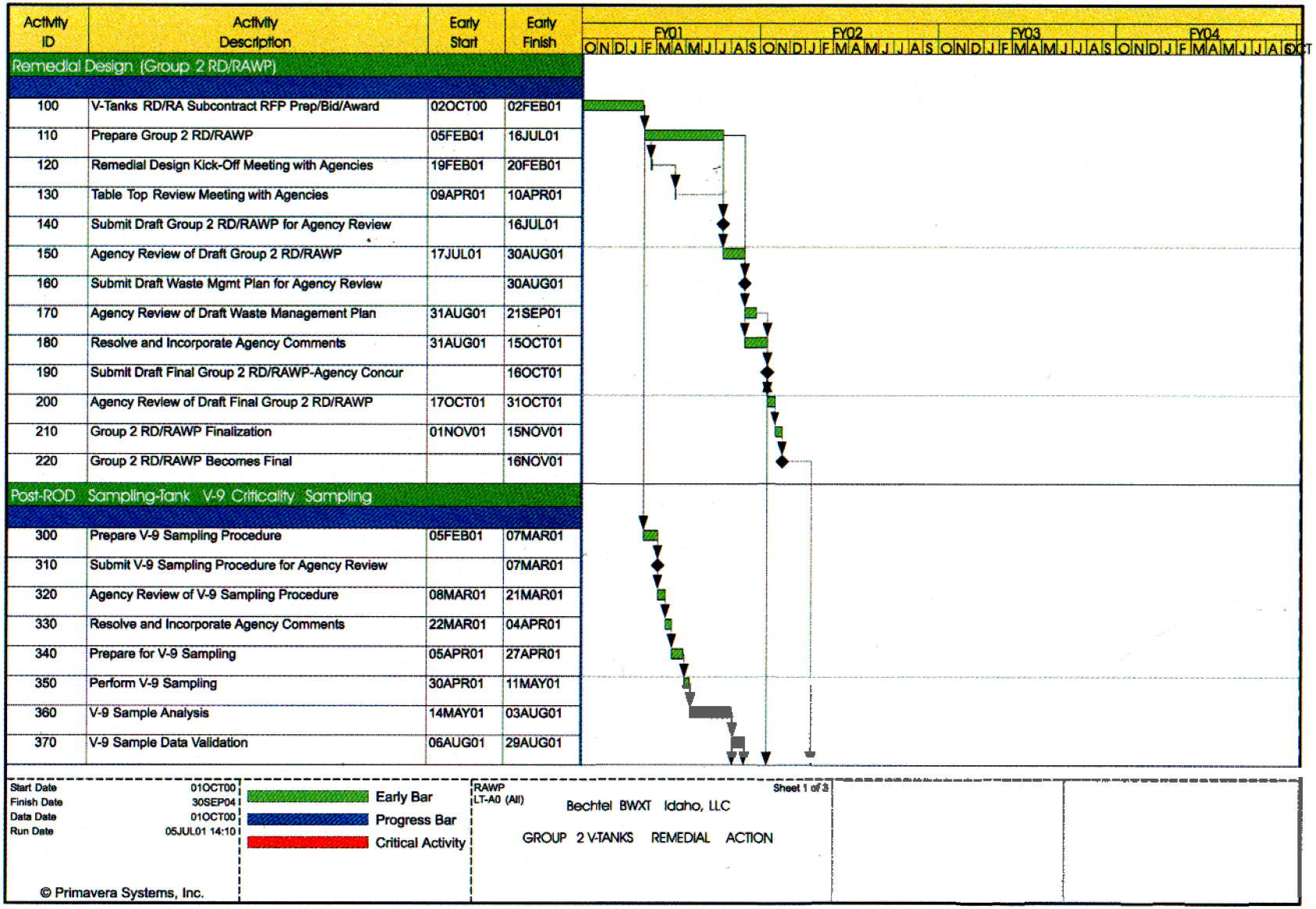

Figure 6-1. V-Tanks remedial design/remedial action project working schedule.

Activity ID	Activity Description	Early Start	Early Finish
380	Transmit V-9 Sample Validated Data to Agencies		30AUG01
390	Perform V-9 Criticality Analysis & Prep EDF Rpt	06AUG01	04SEP01
400	V-9 Criticality Analysis EDF Report to Agencies		05SEP01
V-Tanks Remedial Action			
V-Tanks Contents Removal			
500	Pre-Mobilization Activities	01OCT01*	16JAN02
510	Equipment and Materials Procurement	01OCT01*	07FEB02
520	Initial Mobilization and Site Preparations	17OCT01	14DEC01
530	Removal System Off-Site Mockup Testing	26NOV01*	05MAR02
540	Final Mobilization and Site Preparations	17JAN02	07MAR02
545	Prep TAN-607 Warm Shop - Sludge Interim Storage	17OCT01	07MAR02
550	On-Site Removal System Dry Run Testing	08MAR02	01MAY02
560	Readiness Assessment for Contents Removal	02MAY02	19JUN02
570	Pre-Final Inspection for Contents Removal	20JUN02	21JUN02
580	Resolve Pre-Final Inspection Open Items	24JUN02	08JUL02
590	Prepare Pre-Final Inspection Report	09JUL02	19AUG02
600	Submit Pre-Final Inspection Report to Agencies		20AUG02
610	V-Tanks V-1, V-2 & V-3 Contents Removal	09JUL02	19SEP02
620	V-Tank V-9 Contents Removal	20SEP02	14OCT02
630	V-Tanks Liquid Processing/Shipment to ICDF (SSA)	17JUL02	04DEC02
640	V-Tanks Sludge Drumming/Interim Storage Placemnt	21AUG02	02JAN03
650	Tank Contents Removal Complete		03JAN03
V-Tanks Sludge Interim Storage, Transport & Disp			
700	Sludge Interim Storage	03SEP02	30SEP04
710	Sludge Transport, Offsite Treatment & Disposal	01OCT02	30SEP04
720	V-Tanks Sludge Treatment & Disposal Complete		30SEP04
Tanks & Ancillary Piping/Equip (TAP/E) Removal			
800	Equipment Setup and Preparations	05MAR03	18MAR03
810	Readiness Assessment for TAP/E Removal	19MAR03	08APR03

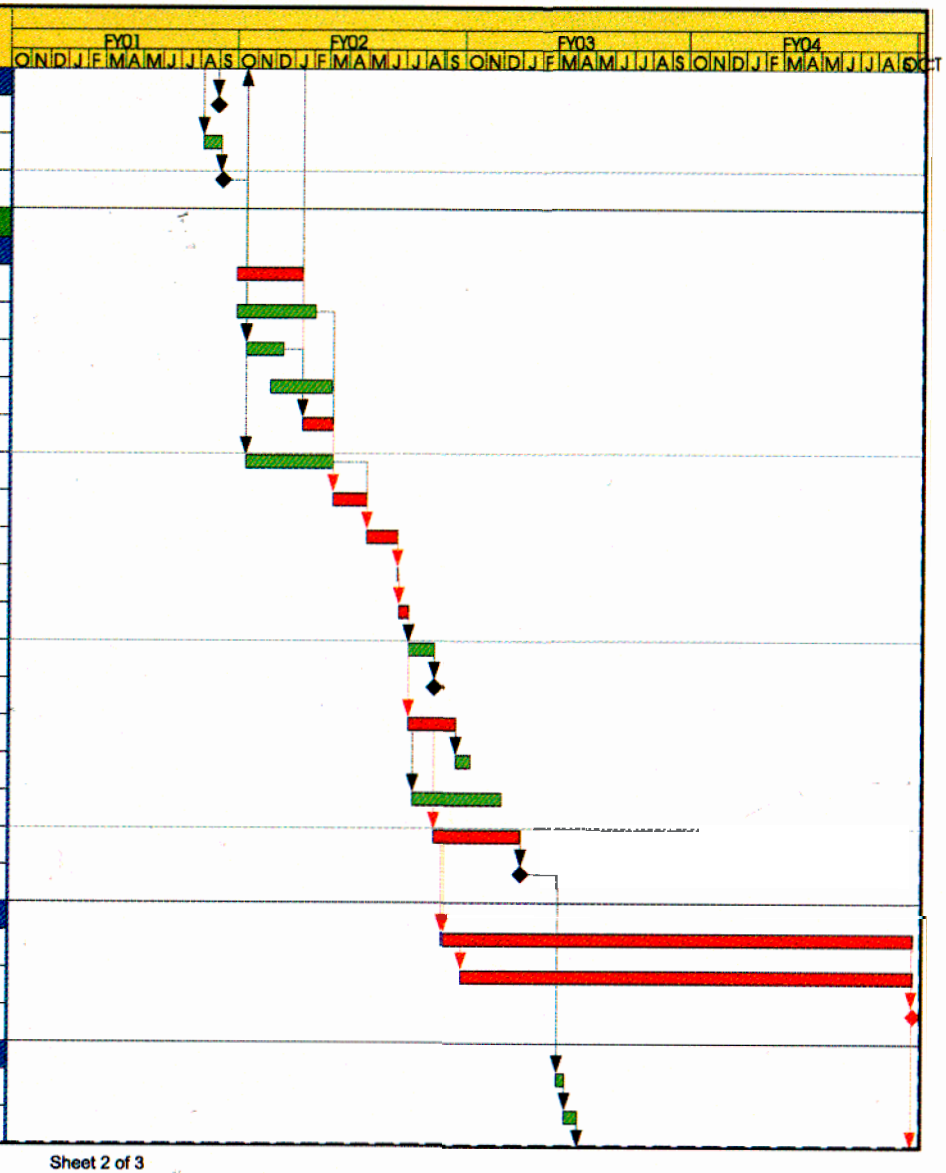

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Figure 6-1. (continued).

Activity ID	Activity Description	Early Start	Early Finish
Tanks & Ancillary Piping/Equip (TAP/E) Removal			
820	Excavation and TAP/E Removal	09APR03	18JUN03
830	Soil Confirmation Sampling and Analysis	19JUN03	28AUG03
840	Pre-Final Inspection Following TAP/E Removal	15JUL03	16JUL03
850	Resolve Open Items & Prep Pre-Final Inspect Rpt	17JUL03	03SEP03
860	Submit Pre-Final Inspection Report to Agencies		04SEP03
870	Contaminated Soil Transport & Disposal at ICDF	29AUG03	26SEP03
880	Backfill Excavation with Clean Soil	29AUG03	24SEP03
TAP/E Processing and Disposal			
900	Process and Package TAP/E	19JUN03	14AUG03
910	TAP/E Transport and Off-Site Disposal	15AUG03	14NOV03
920	TAP/E Removal and Disposal Complete		17NOV03
V-Tanks Remaining Contaminated Soil Removal			
930	Excavate Remaining Contaminated Soil	03MAY04*	30JUN04
940	Transport & Dispose of Contaminated Soil at ICDF	01JUN04	15JUL04
950	Backfill Excavation with Clean Soil	01JUL04	30JUL04
960	Restore Site/Place Institutional Control Signage	02AUG04	13AUG04
970	Perform V-Tanks Site Final Inspection	16AUG04	17AUG04
980	Prepare V-Tanks Site Final Inspection Report	18AUG04	24SEP04
990	Submit Final Inspection Report to Agencies		28SEP04
1000	V-Tanks Remedial Action Complete		30SEP04

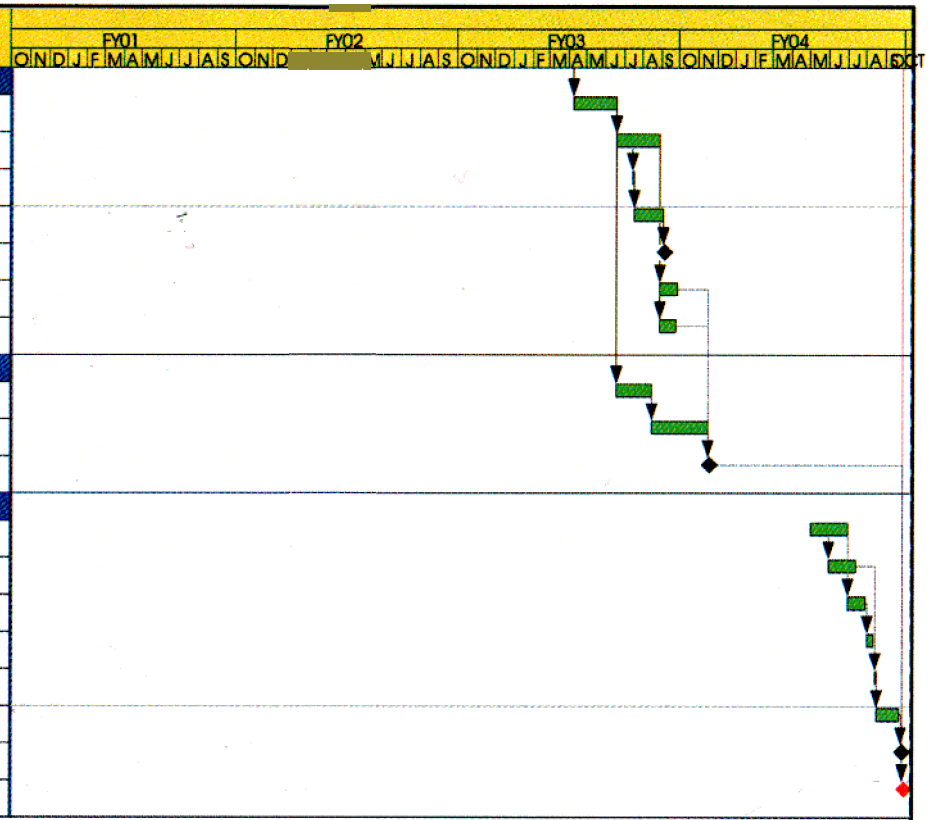

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Figure 6-1. (continued).

6.2 Remedial Action Work Tasks

Implementation of the remedial design will include a sequence of tasks to safely and efficiently remove the contents from the V-Tanks, remove the V-Tanks and piping, remove VCO components within the AOC (INEEL 2001a), further characterize and excavate contaminated soil, and properly store, transport and dispose of contaminated materials. This section provides a description of the subcontractor's work and subcontractor/contractor interfaces. Additional detail is provided in the design drawings, technical specifications, and engineering calculations (Appendices A, B, and C).

6.2.1 Premobilization

Prior to mobilization, as each task is undertaken, all associated documentation to support the work control for that given task will be prepared and approved. These activities ensure operational readiness prior to mobilization. Job safety analyses, safe work permits, radiological work permits, ALARA reviews, confined space entry permits, operational procedures, and other work control forms will be prepared for each major portion of the remedial action. Additional activities include subsurface investigations to identify lines, utilities, and subsurface structures; preparation of critical lift plans; prejob briefings; and equipment procurement. Remediation systems to be used to remove the tank contents will be simulated and tested by field personnel to ensure that all equipment operates properly and is configured as planned for field use. System mockups will also be used to provide comprehensive training to field operators.

6.2.2 Construction Activities

Construction activities will include all work necessary to complete the objectives of the RD/RA WP. The primary construction tasks are described in the following subsections.

6.2.2.1 Mobilization. Mobilization activities will begin with the preexcavation site preparation activities. These activities include establishing the field office with associated utilities, radiological control stations, monitoring locations, and control zones. Site preparation will require the installation of secure fencing and site drainage controls, the construction of shielding using concrete barriers, the construction of secondary containment and laydown areas, and the preparation of the temporary waste storage areas and drum-filling station. The onsite access roadways will be constructed at this time. Mobilization will also include the sequenced delivery of equipment and personnel to the site, as needed, for the site remediation. Following the mobilization of the equipment necessary for the tank contents removal, prestartup testing of the pumping activities will be performed to ensure that the system operates properly and is configured correctly. The results of the mockup and prestartup tests will be provided to support the first Pre-Final Inspection by the Agencies or their designees. The Pre-Final Inspections are discussed in Section 6.5.

6.2.2.2 Tank Contents Removal. A Readiness Assessment will be conducted before removing the tank contents to ensure that all documents, permits, equipment, and safety measures are in place. Before commencing any tank content removal, the 6-in. valve located in the pump room of Building TAN-616 will be opened to allow any liquids present to draw into the tanks. The tank contents will be removed from each of the four tanks prior to any excavation activities. A graded approach will be used due to the nature of the sludge and debris in the tanks. Process pumping equipment will be connected between the waste receptacle and the tank to be emptied. Pipes and hoses used in the pumping system will be double-lined and equipped with sleeves or similar measures to provide secondary containment and to protect against accidental releases and leaks. The process equipment will include a series of filters, pumps, control meters, and portable waste containers. The piping system will be configured to remove the supernatant from Tank V-3. This liquid will be retained separately as it is a large quantity of liquid containing relatively low concentrations of contaminants. This liquid may be used to aid in flushing the

tanks, rather than adding clean water. The sludge from each of the TSF-09 tanks will then be pumped into polyethylene containers (e.g., HICs) where a filter system will extract liquids from the sludge. The extracted liquid will be recirculated to flush the tank interior. The extraction and recirculation of liquids will continue until measured activity on the filtered liquid is approximately equal to the activity of the liquid as it exits the tank. Air sparging, mechanical agitation, or high-pressure water may be used to suspend the tank sludge. This recirculation process will render the tanks as empty as feasible without generating additional wastewater. After the sludge is removed, a second pumping effort will remove the liquid phase. The liquid will be pumped via a filtration system to polyethylene waste containers. Tank V-9, TSF-18, will be pumped in a single effort, combining the liquid and sludge phases. The liquid will be extracted from the sludge and recirculated in a process similar to that used for the TSF-09 tanks. Additional tools may be used to reach behind the baffle.

Although the tanks will be rendered as empty to meet the TSDF's WAC for disposal as debris, residual material may remain in the tank interiors. Cement or grout may be added to the tank interior to secure any residual material.

Sludge removed from the tanks will remain segregated by tank. The sludge will be repackaged into 55-gal drums equipped with an internal dewatering system (Appendix A, Drawing 12 of 20). The waste volume to be added to each container has been calculated based on current characterization data (Appendix C, ABQ02-HP002) so that less than 4 curies Sr-90 (sludge disposal facility limit) and less than 15 grams of fissile material (shipping cask limit) will be placed in each container. This volume will be confirmed or modified based on characterization sampling and analysis of the individual sludge HICs. The sludge dewatering process is necessary to meet the transportation requirements. The internal dewatering system will be used to dewater the sludge by taking suction on the drum through an array of filters.

Liquid waste will be treated in a process system (e.g., a filtering system using granular-activated carbon and oil filters) designed to reduce contaminant concentrations to meet LDRs. Following treatment and waste sampling, the liquid may require solidification to meet transportation and WAC requirements.

The TAN-1704 valve pit, managed under the RCRA-regulated VCO, may contain approximately 200 gal of liquid. The liquid will be pumped and managed separately from the CERCLA components. Storage, treatment, and disposal of this waste are not part of this project.

6.2.2.3 Tank Excavation and Removal. A second Readiness Assessment will be conducted before excavation activities commence. Following the assessment review, the CERCLA and non-CERCLA components will be removed in the following sequence: (1) the aboveground sand filter; (2) piping surrounding Tanks V-1, V-2, and V-3; (3) Tanks V-1, V-2, and V-3; (4) the remaining lines associated with these tanks; (5) Tank V-9, the RCRA-regulated TAN-1704 valve pit and ancillary piping to both units; and (6) remaining VCO lines within the AOC (Appendix A). Excavated soil within the AOC will be managed as radioactive and hazardous waste according to the Waste Management Plan (INEEL 2001d) and sampled to meet the TSDF's WAC. As part of all excavation activities, trench shielding will be installed as designed to protect building foundations and worker safety. Once piping has been cut and removed, the tanks will be visually inspected for integrity. Areas of failed tank or piping integrity will be identified and documented for soil sampling purposes. The tanks and piping will be packaged in accordance with transportation requirements and temporarily staged. During the excavation and removal of components managed under the VCO, the units will be segregated and managed in accordance with RCRA regulations. Items to be removed and the regulatory authority are indicated in Appendix A. Following sampling of excavation floors, described in the *Confirmation Field Sampling Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action* (DOE-ID 2001b), and receipt of acceptable results, the trench shielding will be removed. The excavation

will be backfilled with clean soil. The placement of a geotextile membrane between contaminated soil and clean soil will serve as a delineation marker that will allow future remedial action to determine the limits of contamination.

6.2.2.4 Decontamination. Upon completion of tank and soil removal, equipment designated in the *Decontamination Plan, V-Tanks, Waste Area Group 1, Operable Unit 1-10 Remedial Action* (WESTON 2001a) will be decontaminated. Large equipment will be decontaminated after final use. The decontamination pad will be established in the Drum Storage/Water Storage/Decontamination Area (Appendix A, Drawing 5 of 20). Accumulated water from precipitation within the berm will be pumped daily, as needed, to waste containers. Decontamination solution or spills will be removed immediately. To allow for a single decontamination effort, large equipment will be temporarily staged within the controlled area. The level of decontamination will be determined by the contaminants with which the equipment has had contact. Waste categories anticipated are Hazardous Waste (RCRA regulated), Low Level Waste (Radioactive), Mixed Low Level Waste, and Mixed Low Level Waste with PCBs (TSCA regulated). Procedures to be used for the decontamination of equipment and supplies in accordance with the regulations governing these waste categories are described in the Decontamination Plan (WESTON 2001a). These wastes will be managed in accordance with the *Waste Management Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action* (INEEL 2001a).

6.2.2.5 Demobilization. Demobilization will occur following the completion of field activities. After the majority of equipment has been decontaminated, the temporary waste storage areas, decontamination pad, and access routes will be closed (decommissioned). Additional spot decontamination will follow these activities. Support facilities, such as office and storage areas, will be emptied. Control fences and signage will be established in accordance with the requirements of the *Institutional Control Plan for the Test Area North, Waste Area Group 1* (DOE-ID 2000e).

6.2.2.6 Soil Remediation. Contaminated soil from historical surface releases resulting from former V-Tank operations will be further delineated after the excavation and removal of the tanks. The area to be investigated will not be limited to the AOC. The field effort will include the mobilization and sampling of the area to define horizontal and vertical extent and the assessment of the sample results. Should the sampling effort identify contaminated soil in excess of risk-based activities/concentrations, excavation will be continued until the contamination is reduced to below acceptable levels. The risk from radionuclides and hazardous constituents shall be less than 1 in 10,000 after 100 years of radionuclide decay. Upon completion of excavation, confirmatory soil samples will be collected from the base of the excavation to verify that cleanup goals have been met and that the RAO has been achieved. Excavated soil will be sampled for WAC and disposed of at the INEEL CERCLA Disposal Facility (or other acceptable facility).

6.3 Remedial Action Sampling

6.3.1 Confirmatory Sampling of Excavation Floor Soils

Following excavation of the V-Tanks, piping, and ancillary equipment, the soils on the floor of the excavation will be sampled. Confirmation sampling will demonstrate that the excess cancer risk from all contaminants from the excavation floor soils is less than 10^{-4} and hazard quotient less than 1.

A multiphased sampling approach will be used that incorporates (1) initial soil survey for gamma-emitting radionuclides and VOCs, (2) judgmental sampling of soils that may be discolored or otherwise indicative of contamination, and (3) random, grid-based sampling of excavation floor soils. Samples will be collected from the surface 0 to 0.6 m (0 to 2 ft) and shallow subsurface 0.6 to 1.2 m (2 to 4 ft). Samples will be analyzed for radionuclides, Appendix VIII constituents, and PCB constituents. Should analysis

reveal contaminants greater than the FRG, additional soil will be excavated to comply with remedial action performance objectives. Additional excavation below the safe limit of shoring installed for the tank removal will not be conducted until precautionary measures are in place and proper approval obtained. Soil sampling guidance is provided in the *Confirmation Field Sampling Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action* (DOE-ID 2001b). Verification sampling will be conducted following additional soil excavation (if required).

6.3.2 Waste Characterization

Sludge from each V-Tank will be pumped from the tank into a polyethylene container where liquid within the sludge will be extracted and removed. Sludge from each tank will not be mixed. The sludge will then be sampled in accordance with the Field Sampling Plan for the V-Tanks (DOE-ID 2000c) for the TSDF's WAC. The sludge will then be repackaged into 55-gal drums and further dewatered, if required, in a manner that ensures compliance with the TSDF's WAC. Specifically, each sludge waste container will contain less than 4 Ci Sr-90 (sludge disposal facility limit) and less than 15 grams total fissile material (shipping cask limit). The sludge will be managed in accordance with the *Waste Management Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action* (INEEL 2001d). The liquid from each tank will be treated using a series of filters and pumped into waste containers. As the liquid will be treated to meet LDR standards, the liquid will not necessarily be segregated according to the tank of origin. Following treatment, the liquid will be sampled for the TSDF's WAC and LDR. If required, the liquid will be solidified to meet transportation and disposal requirements. Water analysis will ensure compliance with the TSDF's WAC. The RCRA-regulated valve pit contents will be pumped and managed separately from the CERCLA waste based upon existing sampling data. These liquids will be managed in accordance with the Waste Management Plan (INEEL 2001d).

Excavated soil will be sampled for the TSDF's WAC. The soil will be packaged in 7.3-m^3 (250-ft^3) polyester bags or rolloffs following sampling. The sand filter contents will be packaged separately from the excavated soil and will be placed in a 55-gal drum.

Tanks, ancillary piping, equipment, and personal protective equipment (PPE) will be not be directly sampled. The excavated tanks and piping will be characterized based on their respective V-Tank sludge sampling results. The TAN-1704 valve pit piping and concrete box will be segregated from the CERCLA components. Hazardous waste determination for PPE worn within the controlled area will be based on contact with hazardous wastes and will be managed in accordance with the Waste Management Plan (INEEL 2001d).

Decontamination water and stormwater will be collected and segregated, as appropriate, based on origin into water storage containers/tanks located in the drum storage/water storage/decontamination area, and characterized. Stormwater will be placed in a 10,000-gal tank and decontamination water will be placed in a 1,000-gal container. The waste will be managed in accordance with the characterization. If characterization determines that the collected water exceeds the TSDF's WAC or LDRs, the water will be treated with the backup water treatment process until disposal standards are achieved and then solidified and prepared for shipping, as required. If characterization determines that no hazardous constituents are present and no treatment is required, the collected water will be disposed of at an onsite facility such as the TAN percolation pond via a tanker truck.

6.3.3 Further Characterization of Contaminated Soil

Surface soils within and beyond the AOC boundary will be sampled to further characterize and define the nature and extent of potential contaminants that are present in the soil. This sampling will be conducted following tank removal. Should the sample results and analyses indicate contaminated soil in

excess of risk-based cleanup goals, additional soil will be excavated. To ensure that the contaminated soil has been removed, confirmatory soil sampling will be conducted at the base of the excavations. The details of this sampling will be presented in a future revision of the *Confirmation Field Sampling Plan for the V-Tanks, TSF-009/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action* (DOE-ID 2001).

6.4 Waste Management and Transportation

The remedial actions planned at TAN under the OU 1-10 ROD and this Group 2 RD/RA WP for the V-Tanks will require disposition of various waste streams, which are identified in the Waste Management Plan (INEEL 2001d) prepared as a supporting document to this Group 2 RD/RA WP. These waste streams will be managed and stored in a designated CERCLA or RCRA waste storage area until ultimate disposition in accordance with the Waste Management Plan. Under this plan, waste will be treated, if necessary, and disposed at an acceptable facility. Acceptability of the treatment and/or disposal facility is dependent upon the characterization and classification of waste in the Waste Management Plan and compliance with a treatment or disposal facility's WAC. Facilities must be either (1) a permitted treatment or disposal facility with CERCLA offsite authority, (2) an INEEL disposal facility expressly designated to accept CERCLA waste (e.g., the INEEL CERCLA Disposal Facility), (3) a site with disposal authorization from DOE Headquarters (e.g., the Radioactive Waste Management Complex), or (4) an onsite industrial landfill (e.g., Central Facilities Area landfill).

The CERCLA site for waste management purposes, as defined in the *Federal Facility Agreement and Consent Order,* is the entire INEEL site area. The CERCLA site includes waste management and disposal areas such as the INEEL CERCLA Disposal Facility Complex, the Central Facilities Area Industrial Landfill, the Radioactive Waste Management Area, Argonne National Laboratory-West, and interim storage at Test Area North. Waste generated during remediation activities and stored in a temporary accumulation area within the AOC will be moved to one or more of the waste management areas within the INEEL site or sent offsite for storage, treatment, or disposal. Hazardous waste generated during remediation activities that leaves the AOC will be required to meet LDR standards prior to disposal either onsite or offsite.

Table 6-2 provides a summary of the handling and packaging requirements for each of the anticipated waste streams. Included in the table are estimated volumes, waste classifications for near surface disposal, Department of Transportation (DOT) waste-shipping classifications and packaging requirements, and planned disposal facilities. The information in the table is based on currently available sampling data and will be validated using the results of sampling.

Table 6-2. Proposed waste handling and packaging for remediation waste.

Anticipated Waste Streams		Estimated Waste Volume	Waste Class (10 CFR 61.55)	DOT Classification	Minimum DOT Package Type	Planned DOT Package	Transport Cask/Exclusive Use[1]	Planned Disposal Facility[2]	References
Piping	V-Tank[3]	388 linear ft or 52 ft^3	Class A–Debris	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags/Waste Boxes (IP2)	Exclusive Use	Envirocare	Appendix C Calculation ABQ13
	Other[4]	200 linear ft or 27 ft^3	Class A–Debris	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags/Waste Boxes (IP2)	Exclusive Use	Envirocare	None
	VCO Valve Pit	8 linear ft or 1 ft^3	Class A–Debris	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags/Waste Boxes (IP2)	Exclusive Use	TBD[5]	None
Underground Storage Tanks	Tank V-1	1,570 ft^3	Class A–Debris	LSA II	Strong Tight	Shrink wrap/ Bags[12]	Exclusive Use	Envirocare	Appendix C Calculation ABQ13
	Tank V-2	1,570 ft^3	Class A–Debris	LSA II	Strong Tight	Shrink wrap/ Bags[12]	Exclusive Use	Envirocare	Appendix C Calculation ABQ13
	Tank V-3	1,570 ft^3	Class A–Debris	LSA II	Strong Tight	Shrink wrap/ Bags[12]	Exclusive Use	Envirocare	Appendix C Calculation ABQ13
	Tank V-9	50 ft^3	Class A–Debris	LSA II	Strong Tight	Shrink wrap/ Bags[12]	Exclusive Use	Envirocare	Appendix C Calculation ABQ13
Sludge	Tank V-1	520 gal	Class B–Dewatered Sludge	Type B	Type B	55-gal drums inside Type B cask[6]	Duratek CNS-8-120B	ATG	Appendix C Calculation ABQ02-002
	Tank V-2	520 gal	Class B–Dewatered Sludge	Type B	Type B	55-gal drums inside Type B cask[6]	Duratek CNS-8-120 B	ATG	Appendix C Calculation ABQ02
	Tank V-3	652 gal	Class B–Dewatered Sludge	Type B	Type B	55-gal drums inside Type B cask[6]	Duratek CNS-8-120 B	ATG	Appendix C Calculation ABQ02
	Tank V-9	250 gal	Class B–Dewatered Sludge	Type B	Type B	55-gal drums inside Type B cask[6]	Duratek CNS-8-120 B	ATG	Appendix C Calculation ABQ02

Table 6-2. (continued).

Anticipated Waste Streams		Estimated Waste Volume	Waste Class (10 CFR 61.55)	DOT Classification	Minimum DOT Package Type	Planned DOT Package	Transport Cask/Exclusive Use[1]	Planned Disposal Facility[2]	References
Liquids[10]	Tank V-1	1,164 gal	Class A–Liquid	LSA II	Strong Tight	Duratek PL-8-120 MT/Leakproof polyethylene tanks	Exclusive Use	ICDF/ Envirocare	Appendix C Calculation ABQ02
	Tank V-2	1,076 gal	Class A–Liquid	LSA II	Strong Tight	Duratek PL-8-120 MT/Leakproof polyethylene tanks	Exclusive Use	ICDF/ Envirocare	Appendix C Calculation ABQ02
	Tank V-3	7,647 gal	Class A–Liquid	LSA II	Strong Tight	Duratek PL-8-120 MT/Leakproof polyethylene tanks	Exclusive Use	ICDF/ Envirocare	Appendix C Calculation ABQ02
	Tank V-9	70 gal	Class A–Liquid	LSA II	Strong Tight	Duratek PL-8-120 MT/Leakproof polyethylene tanks	Exclusive Use	ICDF/ Envirocare	Appendix C Calculation ABQ02
	VCO Valve Pit	200 gal	Class A–Liquid	LSA II	Strong Tight	Duratek PL-8-120 MT/Leakproof polyethylene tanks	Exclusive Use	TBD[5]	None
Stormwater	—	15,000 gal	Class A–Liquid	LSA II	Strong Tight	Tanker Truck	Exclusive Use	TAN Percolation Pond	None
Decontamination water	—	2,500 gal	Class A–Liquid	LSA II	Strong Tight	Duratek PL-8-120 MT//Leakproof polyethylene tanks	Exclusive Use	ICDF/ Envirocare	None
Miscellaneous	Sand Filter contents	0.7 ft^3	Class B–Soil	LSA II	Strong Tight	55-gal drum	Exclusive Use	ATG	Appendix C Calculation ABQ02

Table 6-2. (continued).

Anticipated Waste Streams		Estimated Waste Volume	Waste Class (10 CFR 61.55)	DOT Classification	Minimum DOT Package Type	Planned DOT Package	Transport Cask/Exclusive Use[1]	Planned Disposal Facility[2]	References
Soil	Around V-Tanks/ Pipes	922 yd^3	Class A–Soil	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags/Rolloffs	Exclusive Use	ICDF	None
	Additional Excavated Soil[8]	2,200 yd^3	Class A–Soil	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags/Rolloffs	Exclusive Use	ICDF	None
PPE	—	350 ft^3	Class A–Debris	LSA II	Strong Tight	55-gal drums	Exclusive Use	ICDF/ Envirocare	None
Concrete	VCO Valve Pit	88 ft^3	Class A–Debris	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags	Exclusive Use	TBD[5]	None
	Sand filter	22 ft^3	Class A–Soils	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags	Exclusive Use	ICDF/ Envirocare	None
Culverts	—	36 linear ft	Class A–Debris	LSA II	Strong Tight	Lift-Liner™ System (88 in.) Bags	Exclusive Use	Envirocare	None
Solid Waste	Trash	50 yd^3	Survey Clean	Radiologically Clean	N/A	Dumpster	N/A	INEEL Industrial Landfill	None
10,000-gal tank	—	—	Survey Clean	Radiologically Clean	N/A	N/A	N/A	INEEL for Future Use	None
Sludge HICs	—	20 yd^3	Class A	LSA II	Strong Tight	Shrink Wrap/ Bag	Exclusive Use	Envirocare	None
Pumps/Hoses/ Valves	—	20 yd^3	Class A–Debris	LSA II	Strong Tight	B25	Exclusive Use	Envirocare	None
Water Treatment Media and Filters	—	660 gal	Class A or B[9]	LSA II	Strong Tight	55-gal drums	Exclusive Use	Envirocare/ ATG	None
Sand Bags	—	10 yd^3	Clean	—	—	—	—	INEEL Landfill	None
Sampling Equipment, Tents, Glove Bags, Misc. Tools, Tarps, and Rags	—	20 yd^3	Class A–Debris	LSA II	Strong Tight	B25s/Lift Liner Bags	Exclusive Use	ICDF/Enviro care	None

Table 6-2. (continued).

Anticipated Waste Streams		Estimated Waste Volume	Waste Class (10 CFR 61.55)	DOT Classification	Minimum DOT Package Type	Planned DOT Package	Transport Cask/Exclusive Use[1]	Planned Disposal Facility[2]	References
Gravel for onsite roads	—	475 yd^3	Class A	LSA II	Strong Tight	Lift Liner	Exclusive Use	ICDF/Enviro care	None
Spill Platforms/ Plastic Liners	—	50 yd^3	Class A– Debris	LSA II	Strong Tight	Lift Liner	Exclusive Use	ICDF/Enviro care	None
Concrete Shielding	—	50 yd^3	Survey Clean	—	—	—	—	INEEL for Future Use	None
Shoring/Trench Shielding	—	300 linear ft	Survey Clean	—	—	—	—	Return to owner—rented	None
Uncontaminated Materials (Misc.)[11]	—	35 yd^3	Survey Clean	—	—	—	—	INEEL Landfill	—
PCB Decontamination Materials (Wipes, Rags, Kerosene, etc.)	—	10 ft^3	TSCA Waste or MLLW Class A	LSA II	Strong Tight	55-gal drum	Exclusive Use	Envirocare	—

N/A = Not Applicable TBD = To be determined LSA = Low Specific Activity

ICDF = INEEL CERCLA Disposal Facility ATG = Allied Technology Group

1. Exclusive Use is defined by 49 CFR 173.403.

2. The planned disposal facility may be another disposal facility based on Waste Acceptance Criteria as documented in the Waste Management Plan (INEEL 2001a).

3. V-Tank piping refers to those pipes that carried V-Tank contents.

4. Other piping refers to those pipes that carried material other than V-Tank contents.

5. The planned disposal facility is to be determined by the VCO Program.

6. Shipment will occur in Transport Cask to meet DOT requirements.

7. Selected disposal facility will be based on hazardous waste determination at the time of generation.

8. The volume of additional excavated soil is based on the following assumptions. In the area of excavation (1,248 ft^2), soil will be excavated to 2 ft below the tank bottoms; in the AOC (4,000 ft^2), the soil will be excavated to 2 ft; and in the remainder of the fenced area (53,000 ft^2, see Appendix A drawings), the soil will be excavated to 1 ft.

9. The classification of the water treatment media will require sampling to determine the disposal option.

10. Liquids must be solidified prior to land disposal.

11. Air ducts, concrete, electrical lines, air lines, control equipment, etc.

12. Specially fabricated lift liner bag to meet DOT packaging criteria.

6.5 Inspections

6.5.1 Prefinal Inspection

The Agencies, or their designees, will conduct prefinal inspections at three remedial action milestones. The initial inspection will be conducted prior to tank contents removal after the Readiness Assessment has been completed. A second inspection will occur following tank removal and backfill of the excavations. The third prefinal inspection, which may be the final inspection for the V-Tanks sites (TSF-09 and TSF-18), will be conducted once all contaminated soil is excavated and removed from the site. The three prefinal inspections will provide assessments during the remedial action. The DOE-ID will notify the Agencies approximately two weeks prior to the prefinal inspection dates. The inspections will determine the status of remediation activities, including outstanding requirements and actions necessary to resolve any identified issues. All outstanding requirements, along with the actions required to resolve them, will be identified and approved by the Agencies during the prefinal inspections. At the Agencies' discretion, the prefinal inspections may take place without a site visit.

A checklist used to document the prefinal inspections will be developed and implemented upon approval by the Agencies. Action for resolution and the anticipated schedule of completion will be noted next to the outstanding items and documented on the prefinal inspection checklist.

The prefinal inspections will be documented in prefinal inspection reports, which will contain the following elements:

- Names of the inspection participants
- Inspection checklist(s) containing specific project systems, components, startup procedures, or other areas to be inspected to constitute acceptance of remediation activities
- Discussion of all documented inspection findings
- Corrective actions to be taken to correct the deficiencies identified in the inspections, including the required corrective action, acceptance criteria or standards, and planned dates for completion of the actions
- Date for the final inspection.

The prefinal inspection reports will be issued to indicate that the objectives of the ROD (DOE-ID 1999) are being met. The prefinal inspection reports may not be revised or finalized. The inspection will be finalized in the remedial action report documenting the prefinal inspection process. The completed prefinal inspection checklist may be included as an appendix to the remedial action report in accordance with Section 8.4 of the FFA/CO (DOE-ID 1991).

In addition to the prefinal inspections, site visits may be conducted by the Agencies at various points during the project. These site visits will not use prefinal inspection document requirements.

6.5.2 Final Inspection

The final inspection will be scheduled and conducted at completion of the V-Tanks remedial action. The Agency project managers, based on the results of the prefinal inspections, will determine the need for a final inspection. The final inspection, as conducted by the Agencies' project managers or their designees, will confirm resolution of all outstanding items identified in the prefinal inspection and verify

that the OU 1-10 remedial action has been completed in accordance with the requirements of the ROD (DOE-ID 1999).

The final inspection will be completed following demobilization, after all excess materials and nonessential construction equipment have been removed from the sites, and the sites are considered functional and operational. Some equipment may remain onsite to repair items identified during the final inspection. Waste will be located in interim storage areas or transported to the approved TSDF.

A final inspection report will be prepared and submitted to the Agencies for review as a secondary document. The final inspection report will include:

- Identification of the work defined in this Group 2 RD/RA WP and certification that the work was performed and final remediation goals have been met.
- Explanation of any modifications to the Group 2 RD/RA WP.
- Any modifications made to the remedial design during the V-Tanks remedial action phase, including the purpose of the performed modifications and results of the modifications.
- Problems encountered during the V-Tanks remedial action and resolutions to these problems.
- Any outstanding items from the prefinal inspection checklist that were identified and described; in responding to comments received, the prefinal inspection checklist will not be revised, but rather will be finalized in the context of the final report.
- An Operations and Maintenance (O&M) Plan update, if necessary.
- As-built drawings showing final contours and piping (as applicable).

The V-Tanks final inspection report, finalized through formal Agency review and comment resolution, will be incorporated into the OU 1-10 remedial action report, a primary document that will be submitted after completion of the OU 1-10 Group 3 remedial action and inspection. The draft OU 1-10 remedial action report will be submitted within 60 days after the final inspection for OU 1-10 Group 3 sites. Requirements for the OU 1-10 remedial action report will be addressed in the OU 1-10 Group 3 RD/RA WP.

6.6 Supporting Documents

The following sections provide a brief description of the documents that are associated with the V-Tanks remedial action activities, which are addressed in this RD/RA WP.

6.6.1 Remedial Action Confirmation Field Sampling Plan

The remedial action confirmation field sampling plan (FSP) (DOE-ID 2001b) specifies data needs, sampling objectives, sampling locations and frequencies, procedures, and the controls necessary to characterize the soils on the floor of the excavation following tank, pipe, and ancillary equipment removal (Section 6.2.1). The FSP is developed using the established EPA Data Quality Objectives process.

The FSP also addresses sampling requirements for secondary waste generated throughout the tank remediation. Although the intent is to use process and historical data to characterize secondary waste for disposal, there may be instances when field surveys and/or physical sampling and analysis will be

required. Additional waste characterization sampling will be performed for the V-Tank contents. This sampling will be performed in accordance with the existing *Field Sampling Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action* (DOE-ID 2000c).

Revisions to the FSP will also address sampling to satisfy data needs for further soil characterization to determine the nature and extent of contamination at the V-Tank sites.

6.6.2 Health and Safety Plan

A site-specific HASP (INEEL 2001c) will be prepared by the INEEL to provide safety guidance applicable to INEEL staff providing oversight and construction management support for this remediation project. It is a working document that is reviewed and modified accordingly as the project planning documents are developed and finalized, and it covers the following items:

- Task-site responsibility
- Personnel training
- Occupational medical program and medical surveillance
- Safe work practices
- Site control and security
- Hazard evaluation
- Personal protective equipment
- Personnel decontamination and radiation control
- Emergency response for the project sites.

In addition, the subcontractor will develop a project HASP (WESTON 2001b) that incorporates hazard analyses for each task associated with the V-Tank remediation. It aligns closely with the INEEL HASP and provides safety guidance for the subcontractor to follow as they perform the remediation activities.

Safe work documents, such as radiation work permits and job safety analyses, will be developed in accordance with existing INEEL procedures and systems to implement the HASP requirements. They will be modified, supplemented, or generated (as necessary) during the work activities to address changing conditions onsite or revisions to the work methods described in the planning documents.

6.6.3 Decontamination Plan

For the purposes of this plan, the word "decontamination" is defined as those activities required to decontaminate equipment, supplies, and exteriors of waste containers. It does not include the removal of the tank sludge from the tanks, either as part of the initial pumping process or any subsequent removal of interior materials, nor any in-tank contamination fixation or grouting. Finally, the decontamination of PPE will be addressed as a safety issue in the project-specific HASP.

The majority of the field activities that will be conducted as part of the V-Tank remedial action involve the use of various types of equipment to handle radioactive, hazardous, and PCB waste materials. The equipment may be disposed of (if highly contaminated), decontaminated to allow reuse within the INEEL (if remaining contamination has fixed radioactivity), or decontaminated to free release for radiological, hazardous, and PCB constituents. The Decontamination Plan (WESTON 2001a) provides the procedures to be used to meet the regulatory, INEEL, and designated TSDF's requirements that apply to the decontamination activities.

6.6.4 Waste Management Plan

A Waste Management Plan has been prepared as a supporting document to this Group 2 RD/RA WP. The Waste Management Plan describes waste management activities for the V-Tanks' remedial action. The plan identifies waste streams that will be generated, based upon the design and planned implementation of the remedial action. The Waste Management Plan details the approach for waste management, minimization, and disposition. In addition to newly generated waste streams, the Waste Management Plan addresses existing V-Tanks' waste streams that are currently stored at the INEEL from past V-Tanks' activities, which include sampling equipment and PPE from routine monitoring. Ultimate disposition of the waste streams generated or existing for the V-Tanks is based upon the characterization and classification of each waste stream, as well as WAC for acceptable treatment and/or disposal facilities.

6.6.5 Operations and Maintenance Plan

The *Operations and Maintenance Plan for Test Area North, Operable Unit 1-10* (DOE-ID 2000b) covers requirements for ongoing maintenance and inspection and environmental monitoring for OU 1-10 sites following the completion of remedial action. The plan also references and interfaces with the activities covered in the *Institutional Control Plan for the Test Area North Waste Area Group 1* (DOE-ID 2000e) and further addresses requirements for 5-year reviews. The O&M Plan may be revised, as necessary, to incorporate changes and additions identified during the implementation of the plan.

6.6.6 Institutional Control Plan

The V-Tank remedial action will implement institutional controls in accordance with the *Institutional Control Plan for the Test Area North Waste Area Group 1* (DOE-ID 2000e). The plan provides institutional control requirements for all WAG 1 sites requiring controls and inspection items for the annual inspections. The Institutional Control Plan may be revised, as necessary, to incorporate changes and additions identified during the implementation and subsequent 5-year reviews.

6.6.7 Spill Prevention/Response Program

Any inadvertent spill or release of potentially hazardous materials will be subject to project-specific spill prevention controls and countermeasures plan and the substantive requirements contained in the *Emergency Plan/RCRA Contingency Plan* (INEEL 1998) for TAN. Materials or substances will be handled in accordance with the recommendations of the applicable material safety data sheets or waste analyses, which will be located onsite. In the event of a spill, the emergency response plan contained in the project HASP will be activated. All materials and substances on the work site will be stored in accordance with the applicable regulations and will be stored in approved containers. An appendix to the *Emergency Plan/RCRA Contingency Plan* (INEEL 1998) will be prepared for the Interim Storage Sludge Facility.

7. CHANGES TO REMEDIAL DESIGN/REMEDIAL ACTION SCOPE OF WORK AND GROUP 2 RD/RA WP

The OU 1-10 RD/RA SOW describes the preparation of two RD/RA WPs for OU 1-10, one for Group 1 sites and the other for Group 2 sites. The OU 1-10 RD/RA WP for Group 1 sites has been approved through the FFA/CO process by the Agency managers in accordance with the schedule in the RD/RA SOW. For several reasons, the Agency managers agreed that remedial design and subsequent remedial action should progress quickly for the V-Tanks. To implement this process, the Agencies agreed that the Group 2 RD/RA WP only address the V-Tanks and that a subsequent RD/RA WP be developed to address remaining OU 1-10 sites, which include the TSF-03 and WRRTF-01 Burn Pits and the tank contents removal at the PM-2A Tanks (TSF-26). It was agreed that these remaining sites would be known as the Group 3 sites.

The creation of the Group 3 RD/RA WP to address the PM-2A Tanks and the Burn Pits does not have an enforceable milestone for the draft document submittal in the OU 1-10 RD/RA SOW because the creation of the Group 3 RD/RA WP occurred after finalization of the OU 1-10 RD/RA SOW. Rather than revise the OU 1-10 RD/RA SOW, the Agency project managers agreed to establish an enforceable milestone for the draft submittal of the Group 3 RD/RA WP in this Group 2 RD/RA WP, which is a primary document under the FFA/CO. In addition, this Group 2 RD/RA WP details the project's working schedule for the development of the Group 3 RD/RA WP. Table 7-1 shows the schedule for the development of the Group 3 RD/RA WP and includes both the project working schedule and the enforceable milestone.

Table 7-1. Working schedule and enforceable milestones for the Group 3 RD/RA WP development.

Activity	Planned Start Date	Planned Completion Date	Enforceable Completion Date
Remedy Selection for Burn Pits (Native Soil Cover or Excavate and Dispose)	10/01/2002	12/31/2002	—
Submittal of Draft OU 1-10 Group 3 RD/RA WP to Agencies	06/16/2003	06/16/2003	09/30/2004[a]
Agencies Review of Draft Group 3 RD/RA WP	06/17/2003	08/01/2003	—[b]
Prepare Draft Final OU 1-10 Group 3 RD/RA WP	08/04/2003	09/18/2003	—[b]
Agencies Review of Draft Final Group 3 RD/RA WP	09/19/2003	10/06/2003	—[b]
Prepare Final OU 1-10 Group 3 RD/RA WP	10/17/2003	10/22/2003	—[b]
OU 1-10 Group 3 RD/RA WP Finalized	11/05/2003	11/05/2003	—[b, c]

a. Enforceable milestone established by this Group 2 RD/RA WP. Funding uncertainty in outyears has been considered to establish this milestone.

b. Review periods consistent with Section 8.13 of the FFA/CO (DOE-ID 1991).

c. An additional two weeks are allowed for printing and compilation of finalized documents.

The Group 3 RD/RA WP will address the remedial design and remedial action to implement the selected remedy at three OU 1-10 sites: (1) PM-2A Tanks (TSF-26), (2) WRRTF Burn Pits (WRRTF-01), and (3) TSF Burn Pit (TSF-03). The Group 1 RD/RA WP addresses the remedial action for the surficial soils at the PM-2A Tanks, and the Group 3 RD/RA WP will address the remedial action for contaminated soils that are beyond the scope of the Group 1 RD/RA WP. For the PM-2A Tanks, the Group 3 RD/RA WP will also address the tank contents removal phase of the work to implement the remedy from the OU 1-10 ROD. For the two Burn Pits sites, WRRTF-01 and TSF-03, the Group 3 RD/RA WP will address the implementation of the selected remedy, Native Soil Cover, or the contingent remedy, Excavate and Dispose. The selection of the remedy will be based upon evaluation of post-ROD sampling that was conducted at the Burn Pits to determine the most cost-effective remedy.

The OU 1-10 RD/RA SOW also stated that the enforceable milestone for submittal of the remedial action report would be determined and documented in the Group 2 RD/RA WP. Because of the creation of the Group 3 RD/RA WP, the Agency project managers agree that the enforceable milestone for submittal of the remedial action report will not be determined and documented until the Group 3 RD/RA WP.

8. INSTITUTIONAL CONTROLS, OPERATIONS AND MAINTENANCE, AND FIVE-YEAR REVIEW

This section presents a summary of the activities planned after the remedial action, which includes institutional controls, operations and maintenance, and the 5-year review of site conditions.

8.1 Institutional Controls

Institutional controls have been implemented at the V-Tanks sites in accordance with the *Institutional Control Plan for the Test Area North Waste Area Group 1* (DOE-ID 2000e). No activities throughout the course of the remedial action are expected to modify the institutional control requirements for these sites (TSF-09 and TSF-18). Following completion of the entire remedial action activities for the V-Tanks, the institutional control requirements will be reevaluated. Changes, if necessary, will be made to the WAG 1 Institutional Control Plan, following Agency project manager review of the proposed changes. These institutional control changes will be implemented for the V-Tanks sites following agreement by the Agency project managers.

8.2 Operations and Maintenance

Operations and maintenance activities for the V-Tanks sites are covered in the *Operations and Maintenance Plan for the Test Area North Waste Area Group 1* (DOE-ID 2000b). Operations and maintenance activities are not expected to change for the V-Tanks throughout the duration of the remedial action. Following full restoration of the site, any changes to operations and maintenance requirements will be made. These changes, if necessary, will be reviewed by the Agency project managers and will be implemented.

8.3 Five-Year Review

In accordance with the *National Oil and Hazardous Substances Pollution Contingency Plan* (EPA 1990) for sites where contamination is left in place above health-based levels, a review will be conducted within five years from the initiation of construction activities at OU 1-10 to ensure that the remedy and institutional controls are still effective in protecting human health and the environment. Subsequent 5-year reviews will be completed within five years of the previous review. The reviews will be used to assess the need for future long-term environmental monitoring and administrative/institutional controls. Five-year reviews will be conducted for the remediated sites with institutional controls until 2099 (i.e., until the 100-year institutional control period expires) or until it is determined that the site no longer poses a risk to human health or the environment.

The V-Tanks remedial action will occur over several years. Institutional controls may be required during the phased remedial action and upon completion of the remedy based on contaminant levels remaining onsite. Should contamination above unrestricted land use concentrations exist, institutional controls will be implemented. The Institutional Control Plan (DOE-ID 2000e) identifies the types of controls that may be implemented. The Institutional Control Plan (DOE-ID 2000e) and O&M Plan (DOE-ID 2000b) address the inspections during the first five years after the remedial action. Inspection details and inspection checklists are provided in these plans. After the first 5-year review, the Agencies may revise the inspection frequency. Further requirements for 5-year reviews will be developed and addressed in a revision to the O&M Plan (DOE-ID 2000b).

9. REFERENCES

42 USC 9601 et seq., 1986, "Comprehensive Environmental Response, Compensation, and Liability Act of 1980," as amended by the "Superfund Amendments and Reauthorization Act of 1986."

Blackmore, 1998, Memo from C. S. Blackmore, INEEL, to J. T. Taylor, INEEL, Idaho Falls, March 10, 1998, "Criticality Safety Issues Associated with the TAN V-Tanks," CSB-004-98.

DOE, 1989, *The Idaho National Engineering Laboratory Sampling and Analysis Data Document*, ORNL/TM-11239, Draft, Vol. 1, September 1989.

DOE-ID, 1991, *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory,* U.S. Department of Energy Idaho Operations Office, U.S. Environmental Protection Agency Region 10, and State of Idaho Department of Health and Welfare, Administrative Docket *1088-06-120*, December 9, 1991.

DOE-ID, 1997, *Comprehensive Remedial Investigation/Feasibility Study for the Test Area North, Operable Unit 1-10 at the Idaho National Engineering and Environmental Laboratory*, U.S. Department of Energy Idaho Operations Office, DOE/ID-10557, Revision 0, November 1997.

DOE-ID, 1998, *Field Sampling Plan for Test Area North TSF-09, TSF-18, and TSF-26 Area Soils*, DOE/ID-10635, Revision 0, June 1998.

DOE-ID, 1999, *Final Record of Decision for Test Area North, Operable Unit 1-10*, U.S. Department of Energy Idaho Operations Office, DOE/ID-10682, Revision 0, December 1999.

DOE-ID, 2000a, *TAN WAG 1 OU 1-10 Remedial Design/Remedial Action Scope of Work,* U.S. Department of Energy Idaho Operations Office, DOE/ID-10723, Revision 0, February 2000.

DOE-ID, 2000b, *Operations and Maintenance Plan for Test Area North, Operable Unit 1-10,* U.S. Department of Energy Idaho Operations Office, DOE/ID-10711, Revision 0, August 2000.

DOE-ID, 2000c, *Field Sampling Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action*, U.S. Department of Energy Idaho Operations Office, DOE/ID-10794, Revision 0, November 2000.

DOE-ID, 2000d, *Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites*, U.S. Department of Energy Idaho Operations Office, DOE/ID-10587, Revision 6, September 2000.

DOE-ID, 2000e, *Institutional Control Plan for the Test Area North Waste Area Group 1,* U.S. Department of Energy Idaho Operations Office, DOE/ID-10724, September 2000.

DOE-ID, 2001a, *Explanation of Significant Differences for the Record of Decision for the Test Area North Operable Unit 1-10*, U.S. Department of Energy Idaho Operations Office, DOE/ID-10908, Revision 0, November 2001.

DOE-ID, 2001b, *Confirmation Field Sampling Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action*, U.S. Department of Energy Idaho Operations Office, DOE/ID-10876, June 2001.

EDF-ER-325, 2001, "Calculation of the 99% upper confidence limits for U-235 and U-238 in Test Area North Tank V-9 (TSF-18), sampling for Operable Unit 1-10 to address criticality safety issue resolution," Idaho National Engineering and Environmental Laboratory, October 2001.

EPA, 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, Interim Final, EPA/540/G-89/004, October 1988.

EPA, 1990, "National Oil and Hazardous Substances Pollution Contingency Plan," *Federal Register,* Volume 55, U.S. Environmental Protection Agency, 1990 (currently available at 40 CFR 300).

Hain, K. E., Department of Energy Idaho Operations Office, to W. Pierre, Environmental Protection Agency, Region X, and D. Nygard, Idaho Department of Health and Welfare, November 3, 1998, Subject: "Transmittal of Analytical Results and Limitations and Validation Reports for WAG 1 Surface Soil Sampling at the V-Tank and PM-2A Tank Sites." OPE-ER-169-98

IDEQ, 2000, B. R. Monson, IDEQ, to D. N. Rasch, DOE-ID, "Enclosure: Consent Order," Idaho Code 39-4413, June 14, 2000.

INEEL, 1998, *INEEL Emergency Plan/RCRA Contingency Plan*, Idaho National Engineering and Environmental Laboratory, PLN-114, Companywide Manual 16A, current version.

INEEL, 2001a, *Voluntary Consent Order NEW-TAN–008 System Identification, TAN-616 Liquid Waste Treatment System*, Idaho National Engineering and Environmental Laboratory, INEEL/EXT-2000-01263, Revision 1, June 2001.

INEEL, 2001b, *Characterization and Decision Analysis Report for TAN-616 Liquid Waste Treatment Facility*, Idaho National Engineering and Environmental Laboratory, INEEL/EXT-01-00029, Revision 0, May 2001.

INEEL, 2001c, *Tank V-1, V-2, V-3, and V-9 (TSF-09 and TSF-18) Health and Safety Plan, Waste Area Group 1, Operable Unit 1-10 Remedial Design,* Idaho National Engineering and Environmental Laboratory, INEEL/EXT-01-00532, 2001.

INEEL, 2001d, *Waste Management Plan for the V-Tanks, TSF-09/18, at Waste Area Group 1, Operable Unit 1-10 Remedial Action,* Idaho National Engineering and Environmental Laboratory, INEEL/EXT-01-00759, 2001.

INEL, 1994, *Preliminary Scoping Track 2 Summary Report for the Test Area North Operable Unit 1-05: Radioactive Contamination Sites*, Idaho National Engineering Laboratory, INEL-94/0135, Revision 0, October 1994.

MCP-7, June 2001, "Radiological Work Permit," Revision 15, *Manual 15b-Radiation Protection Procedures*, Radiation Protection.

MCP-62, July 1999, "Waste Generator Services-Conditional Industrial Waste Management," Revision 2, *Manual 17-Waste Management*, Environmental Protection and Compliance.

MCP-69, December 2000, "Waste Generator Services–Hazardous Waste Management," Revision 3, *Manual 17-Waste Management*, Environmental Protection and Compliance.

MCP-70, December 2000, "Waste Generator Services–Mixed Low-Level Waste Management," Revision 4, *Manual 17-Waste Management*, Environmental Protection and Compliance.

MCP-124, July 2000, "Response to Abnormal Radiological Situations," Revision 3, *Manual 15B-Radiation Protection Procedures*, Radiation Protection.

MCP-187, September 2000, "Posting Radiological Control Areas," Revision 8, *Manual 15B-Radiation Protection Procedures,* Radiation Protection.

MCP-227, August 2001, "Sampling and Analysis Process for CERCLA and D&D Activities," Revision 8, *Manual 18-Closure Management,* Environmental Restoration.

MCP-230, June 1996, "Environmental Restoration Document Control Interface," Revision 5, *Environmental Restoration Management Control Procedures Manual*, Environmental Restoration.

MCP-231, July 2000, "Logbooks," Revision 4, *Manual 18-Closure Management*, Environmental Protection and Compliance.

MCP-241, August 1996, "Preparation of Characterization Plans," Revision 2, *Environmental Restoration Management Control Procedures Manual,* Environmental Protection and Compliance.

MCP-244, September 1999, "Chain-of-Custody, Sample Handling, and Packaging for CERCLA Activities," Revision 3, *Manual 18-Closure Management*, Environmental Restoration.

MCP-425, July 2000, "Radiological Release Surveys and the Disposition of Contaminated Materials," Revision 4, *Manual 15B-Radiation Protection Procedures*, Radiation Protection.

MCP-540, March 2001, "Documenting the Safety Category of Structures, Systems, and Components," Revision 13, *Manual 10A-Engineering and Research*, Quality.

MCP-557, July 2001, "Managing Records," Revision 6, *Manual 1-General Administration and Information*, General Administration and Information.

MCP-2742, February 2001, "Temporary Facilities," Revision 1, *Manual 14A-Safety and Health-Occupational Safety and Fire Protection*, Safety and Fire Protection.

MCP-2783, March 2000, "Startup and Restart of Nuclear Facilities," Revision 3, *Manual 9-Operations,* Operations.

MCP-2864, September 1999, "Sample Management," Revision 3, *Manual 18-Closure Management*, Environmental Restoration.

MCP-3449, June 2001, "Safety and Health Inspections," Revision 2, *Manual 14A-Safety and Health-Occupational Safety and Fire Protection*, Safety and Fire Protection.

MCP-3472, August 1999, "Identification and Characterization of Environmentally Regulated Waste," Revision 0, *Manual 17-Waste Management*, Waste Management.

MCP-3475, September 1999, "Temporary Storage of CERCLA-Generated Waste at the INEEL," Revision 1, *Manual 18-Closure Management*, Environmental Protection and Compliance.

MCP-3562, April 2001, "Hazard Identification, Analysis, and Control of Operational Activities," April 2001, Revision 3, *Manual 9-Operations*, Operations.

Nielsen, 2001, Memo from J. W. Nielsen, INEEL, to R. G. Peatross, INEEL, October 10, 2001, "Criticality Issues Associated with the Removal of the Material from Tank V-9," JWN-03-01.

PLN-114, July 2001, "INEEL Emergency Plan/RCRA Contingency Plan," Revision 16, *Manual 16A-Emergency Preparedness Base Plan*, Emergency Preparedness.

PRD-160, April 2000, "Hoisting and Rigging," Revision 2, *Manual 14A-Safety and Health-Occupational Safety and Fire Protection*, Safety and Fire Protection.

PRD-183, "Radiation Protection–INEEL Radiological Control Manual," *Manual 15A—Radiation Protection–INEEL Radiological Control Manual*. PRD-5006, April 2001, "Subcontractor/Supplier Quality Plan," Revision 1, *Subcontractor Requirements Manual,* Quality Department.

PRD-1007, May 2000, "Work Coordination and Hazard Control," Revision 4, *Subcontractor Requirements Manual*, Project and Construction Management.

PRD-2007, April 2000, "Hoisting and Rigging," *Subcontractor Requirements Manual*, Revision 1, Project and Construction Management.

PRD-2012, June 2001, "Lockout and Tagout," Revision 2, *Subcontractor Requirements Manual*, Project and Construction Management.

PRD-2014, June 2001, "Excavations and Surface Penetrations," *Subcontractor Requirements Manual*, Project and Construction Management.

PRD-5006, April 2001, "Subcontractor/Supplier Quality Plan," Revision 1, *Subcontractor Requirements Manual*, Quality.

WESTON, 2001a, *Decontamination Plan, V-Tanks, Waste Area Group 1, Operable Unit 1-10 Remedial Action*, Roy F. Weston, Inc., 2001.

WESTON, 2001b, *Tanks V-1, V-2, and V-3 (TSF-09) and Tank V-9 (TSF-18) Health and Safety Plan, Waste Area Group 1, Operable Unit 1-10*, Roy F. Weston, Inc., 2001.

WESTON, 2001c, *Subcontractor Quality Plan – Treatment and Disposal of V-Tank Wastes and Associated Equipment*, Roy F. Weston, Inc., 2001.